

UNIVERSAL
LIBRARY

OU_162601

UNIVERSAL
LIBRARY

OSMANIA UNIVERSITY LIBRARY

Call No. 590.942

Accession No. 25928

Author Richmond

Title Wild Animals of Britain

This book should be returned on or before the date
last marked below.

WILD ANIMALS OF BRITAIN

"In this book," says the author, "you may read of the ferocious Wild Cat and majestic Red Deer which roam the bleak wastes of the Scottish Highlands; and you may read also of the familiar Rabbit and of that tiny pixy of the larder, the mischievous House Mouse. Maybe our country is not so richly stocked with game as are the grasslands and jungles of Africa. Our woodlands no longer conceal the lairs of prowling monsters, nor, on Saturday afternoon or Sunday walks can we go out on safari, expecting to bring back elephant tusks, leopard skins, or other trophies of high adventure; but if we have eyes to see and patience to watch, we can discover much that is equally exciting."

The book is divided into two sections. The first deals in general terms with the Animal Kingdom, defines an animal, and shows how the species now inhabiting the world have been evolved from earlier and more lowly forms. The second passes in review all the genera of animals that are still to be found wild in or around the coasts of the British Isles.

Already published in this Series

ANIMALS. An introduction to Biology.

By T. M. SAVORY

MAN'S UNWRITTEN PAST. An introduction to Pre-history. By

EDITH PLANT

THE BRITISH BIRD. By E. A. R. ENNION

Also in this Series

ANIMALS: AN INTRODUCTION TO ZOOLOGY
By THEODORE H. SAVORY, M.A.

MAN'S UNWRITTEN PAST
By EDITH PLANT, B.A.

THE BRITISH BIRD
By E. A. R. ENNION, B.A



PLATE I

STOAT ON THE WARPATH—a typically alert attitude.

REALMS OF NATURAL SCIENCE

GENERAL EDITOR: F. H. C. BUTLER, M.A.(CANTAB.), M.Sc.(LONDON)

WILD ANIMALS OF BRITAIN

BY

W. KENNETH RICHMOND, M.A.

Aggival



GEOFFREY CUMBERLEGE
OXFORD UNIVERSITY PRESS

OXFORD UNIVERSITY PRESS

AMEN HOUSE, WARWICK SQUARE

LONDON, E.C.4

Edinburgh Glasgow New York

Toronto Melbourne Capetown

Bombay Calcutta Madras

GEOFFREY CUMBERLEGE

PUBLISHER TO THE UNIVERSITY

First published 1946

PRINTED IN GREAT BRITAIN BY
MORRISON AND GIBB LTD., LONDON AND EDINBURGH

CONTENTS

SECTION I

CHAP.		PAGE
I.	THE LADDER OF LIFE	I
II.	ANIMALS PAST AND PRESENT	13
III.	BRITISH WILD ANIMALS	24
IV.	FUR AND FANG	33
V.	ANIMAL MIND	39
VI.	FATHERS, MOTHERS	46
VII. AND CHILDREN	54
VIII.	WINTER LIFE	59

SECTION II

IX.	THE OCEAN-GOERS (WHALES AND PORPOISES)	67
X.	THE INSECT-EATERS (HEDGEHOG, MOLE, SHREWS)	77
XI.	THE NIGHT-FLIERS (BATS)	86
XII.	LESSER HUNTERS (THE WEASEL FAMILY)	94
XIII.	GREATER HUNTERS (OTTER, BADGER, FOX, WILD CAT)	102
XIV.	SEALS	114
XV.	DOUBLE-TOOTHED RODENTS (RABBITS AND HARES)	124
XVI.	SINGLE-TOOTHED RODENTS (I. SQUIRRELS AND DORMICE)	137
XVII.	SINGLE-TOOTHED RODENTS (II. RATS)	146
XVIII.	SINGLE-TOOTHED RODENTS (III. MICE AND VOLES)	153
XIX.	THE FLEET OF FOOT (DEER)	164
	INDEX	175

LIST OF PLATES

AND ACKNOWLEDGMENTS

PLATE

I. STOAT ON THE WARPATH. (<i>Oliver G. Pike</i>)	<i>Frontispiece</i>
II. KILLER WHALES. (<i>Paul Popper</i>)	FACING PAGE 6
HEAD AND SHOULDERS OF FIN WHALE. (<i>Central Press</i>)	6
III. WATER SHREW. (<i>Phyllis Kelway</i>)	7
HEDGEHOG UNFURLING. (<i>Phyllis Kelway</i>)	7
IV. LONG-EARED BAT. (<i>Paul Popper</i>)	40
V. POLECAT. (<i>Oliver G. Pike</i>)	41
YOUNG WEASEL. (<i>Paul Popper</i>)	41
VI. PINE MARTENS. (<i>Dorien Leigh</i>)	56
VII. BADGER. (<i>Oliver G. Pike</i>)	57
FOX. (<i>Phyllis Kelway</i>)	57
VIII. OTTER IN PROFILE. (<i>Oliver G. Pike</i>)	88
OTTER TAKING A NAP. (<i>Phyllis Kelway</i>)	88
IX. ATLANTIC GREY SEALS. (<i>G. Frazer Darling</i>)	89
X. RABBIT. (<i>Paul Popper</i>)	104
LEVERET IN ITS FORM. (<i>Paul Popper</i>)	104
XI. RED SQUIRREL. (<i>Phyllis Kelway</i>)	105
DORMOUSE. (<i>Phyllis Kelway</i>)	105
GREY SQUIRREL. (<i>Phyllis Kelway</i>)	105
XII. BLACK RAT AND BROWN RAT. (<i>Phyllis Kelway</i>)	152
XIII. HARVEST MOUSE. (<i>Phyllis Kelway</i>)	153
BANK VOLE. (<i>Phyllis Kelway</i>)	153

PLATE		FACING PAGE
XIV.	YELLOW-NECKED MOUSE. (<i>Phyllis Kelway</i>) .	160
	NEST OF FIELD VOLES. (<i>By courtesy of the Yorkshire Museum</i>)	160
	FIELD MOUSE. (<i>By courtesy of the Yorkshire Museum</i>)	160
XV.	RED DEER. (<i>Seton Gordon</i>)	161
	FALLOW DEER, BUCK AND DOE. (<i>Paul Popper</i>) .	161

SECTION ONE

CHAPTER I

THE LADDER OF LIFE

THIS little book, for want of a better title, has chosen to call itself *Wild Animals of Britain*. In it you may read of the ferocious Wild Cat and majestic Red Deer which roam the bleak wastes of the Scottish Highlands ; and you may read also of the familiar Rabbit and of that tiny pixy of the larder, the mischievous House Mouse. Maybe our country is not so richly stocked with game as are the grasslands and jungles of Africa. Our woodlands no longer conceal the lairs of prowling monsters, nor, on Saturday afternoons or Sunday walks, can we go out on safari expecting to bring back elephant tusks, leopard skins, or other trophies of high adventure ; but, if we have eyes to see and patience to watch, we can discover much that is equally exciting.

Before we set out on our quest we must first of all be sure that we know what we mean by the word 'animal.' Supposing we ask ourselves the old question : Animal, Vegetable, or Mineral ? Probably at some time or other you have all taken part in the well-known guessing competition of that name, but who ever paused to ask himself just what were the differences between the three ? The difference between a cabbage, say, and a stone seems obvious enough. One is alive, the other is not, never was, and never can be. The cabbage, we say, *grows* ; but then, if you have been in a chemistry laboratory, you know that crystals *grow*—that they build themselves up, as it were, of their own accord. Which seems to suggest that the difference between a dead

thing and a living creature cannot readily be made clear by any ordinary scientific explanation.

Life itself is a mystery which is, and must remain, unsolved. The sap rising inside the tree's trunk, filling and swelling the dark buds, the moss and lichen that cover its bark, the bird singing or the squirrel frisking among its branches—it is the same inner force which makes them what they are and sustains them till they die. All life is indivisible; it is only in its myriad forms that it differs; or, to put it more simply, the cabbage is as much alive as you are.

But how about the difference between a cabbage and a sea-anemone? Both are equally alive; yet one is a plant whereas the other, we are told, is an 'animal'. Why? Once again a plain answer is not so readily forthcoming as might appear at first sight. To be sure, the dissimilarities between the higher forms of animal and plant life are obvious enough, but when it comes to defining the *essential* differences at the lowest level then the question becomes more difficult; indeed, it is a problem upon which the most advanced biologists still hesitate to pronounce dogmatically. As Professor Haldane and Dr. Julian Huxley have pointed out: 'Most people . . . would say that the animal moved while the plant did not; that the animal was conscious while the plant was not; that the animal devoured its food, while the plant absorbed its nutriment from its surroundings. None of these criteria, however, is absolute. Many animals, like coral-polyps or sea-squirts, are as rooted to the spot as most plants; while some undoubted plants move about. . . . As a matter of fact, the only valid distinction between plants and animals is concerned with the type of foodstuffs which they can utilize. All organisms, plant or animal, need carbon, hydrogen, nitrogen, and oxygen to build the bulk of their bodies. Green plants can, with the aid of sunlight, obtain carbon from the carbon dioxide of the air or water in which they live. They can obtain their hydrogen from

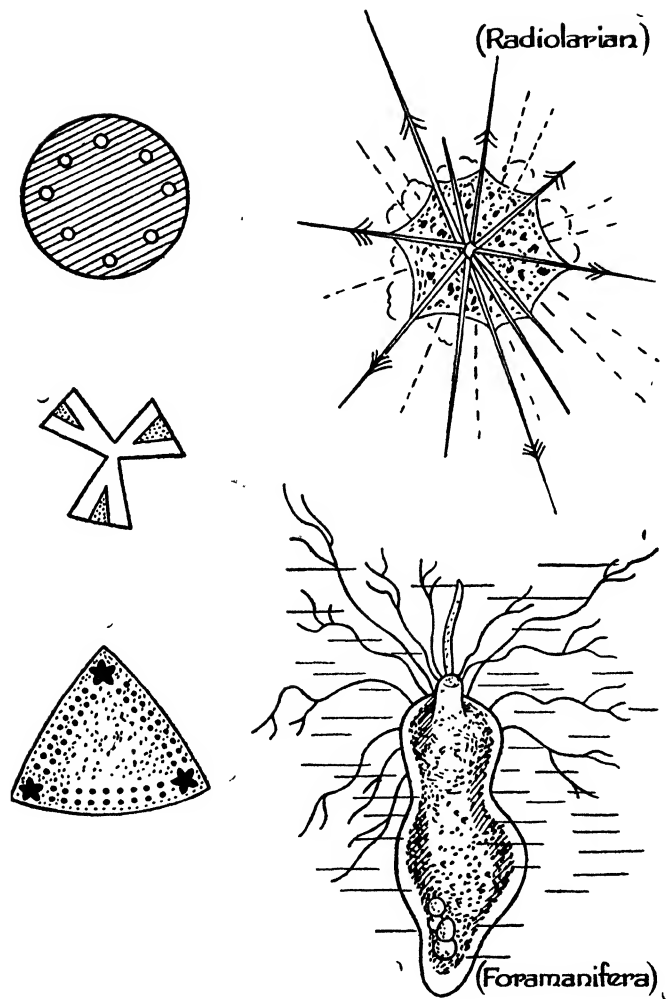


FIG. 1.—Animal or Vegetable?

water and salts, their oxygen directly from the air, their nitrogen from simple mineral salts like nitrates. In other words, the green plant can build up living protoplasm from elements and the simplest components. . . . Animals, on the other hand, cannot achieve this synthesis.' ¹ In other words, animals must rely on food supplies which have *already* been built up into living tissue.

This being so, it seems fair to suppose that plants evolved before animals, if only because, of the two, their needs were the simpler. There cannot be much doubt that the animal kingdom could never have become what it has, had it not been for the existence of a liberal supply of greenstuffs—though it is arguable that most plants could have survived the struggle for existence without the assistance of animals. The problem of which of the two forms of life was the first to appear is one that admits of hypothetical solutions rather than of clear proof. Darwin, great theorist as he was, would not commit himself further than saying that it was *possible* that all species, whether plant or animal, were derived from some single, common prototype, or, to quote his actual words, 'All organic beings which have ever lived on this earth may be descended from some one primordial form'. (*The Origin of Species*, chap. xv.)

How small and lowly this earliest creature must have been we can only guess. We cannot attempt to explain how the phenomenon of life first appeared: we may eventually find it impossible to explain; but we do know that once the process had been set in motion it followed two main lines of development, one vegetable, the other animal—lines which have since become widely divergent. The fact that we now find it difficult to fix a precise borderline between the two at the point where they originally diverged need not greatly concern us at the moment. The important thing is that we should bear in mind the probability of their

¹ *Animal Biology*. (Clarendon Press.)

common origin, and at the same time know something of the reasons for their developing in such different ways.

The first plants must have been so small as to be almost or quite invisible to the naked eye (always remembering, of course, that at that time there were no eyes to see them !). No doubt they resembled yeast spores or the primitive diatoms which can only be examined under a microscope. They inhaled carbon dioxide and fed on chemical salts which they obtained directly from the sea-water in which they floated or from the earth on which they came to rest. From them there came the fungi, algae, mosses, ferns, flowers, and trees of the modern world.

In much the same way animals developed from insignificant beginnings. Here, however, we must note two fundamental distinctions : first, that they fed chiefly on materials which had first of all been built up into living tissue either by plants (or by other animals on which they preyed) ; secondly, that they breathed, not carbon dioxide, but oxygen.¹

Possibly you are wondering where these abstruse questions are leading us and why we trouble to ask them. You are eager, I dare say, to hasten on to the chapters which tell of the colossal Blue Whale (which weighs as much as forty elephants), or the bloodthirsty Stoat (the pocket Tiger of our English hedgerows) ; but before doing that, it is surely worth while pausing to consider the minute beginnings from which all species of animals now existing—including *Homo sapiens*—took their rise. To the scientist a gnat is as much an animal as is the tiger, and so, for that matter, are the red and white corpuscles that throng our veins and arteries, thousands of which are contained in the slightest pin-prick of human blood. Usually when we speak of an

¹ Another point : there are considerable differences between the structure of animal and plant cells. But this is a highly complicated matter and would detain us too long if it were dealt with here.

'animal' we have in mind some furry beast like the Wolf, Lion, or Horse ; but it is necessary for us to remember that each of these is, in fact, the offspring of a long line of ancestors, and that it has only become what it now is as the result of an evolution extending unbelievably far back into Time.

How did this come about ?

Maybe you have heard of the Amoeba, that speck of living jelly (or protoplasm) which may be found anywhere in fresh water. It is far too small for us to see it comfortably without the aid of the microscope. Magnify this all but invisible cell a hundred times and you will observe that this speck of jelly is indeed alive. Clearly it is able to move about and in a dim sort of way to seek its food ; yet it has neither arms, legs, nor mouth. Watch it as it floats in a drop of water : see how it reaches out and wraps itself about its 'prey', almost like some miniature Octopus. In the centre of this shapeless blob of living material you will see a darker core, the nucleus ; and from time to time a hole will appear,—rather like a bursting bubble—through which the creature expels waste products. The Amoeba has neither stomach nor intestines, yet you can see that it does, in fact, digest its food, because here and there you will notice bits of food embedded in its transparent body. Here, without any doubt, we have a small-scale animal.

Now there is one very wonderful power that the Amoeba possesses, and one which everyone ought if possible to see demonstrated. Let me try to describe it for you. When the Amoeba has reached a certain age it begins to change shape. The nucleus, instead of remaining roughly circular, lengthens into an oval and the surrounding protoplasm gets narrower across the middle. After a time it assumes the shape of a dumb-bell or figure 8, as though the nucleus were being forced apart at both ends, stretched out like a piece of elastic. Finally the thread of jelly parts,



PLATE II

Above. KILLER WHALES.

Below. HEAD AND SHOULDERS OF FIN WHALE.

Note the diminutive proportions to which the forelimbs have been reduced.'



PLATE III

Above. WATER SHREW.

Globules of water are still on the fur.

Below. HEDGEHOG CAUTIOUSLY UNFURLING.

and instead of one we see *two* Amoebas, each perfect in itself and ready to go its own way.

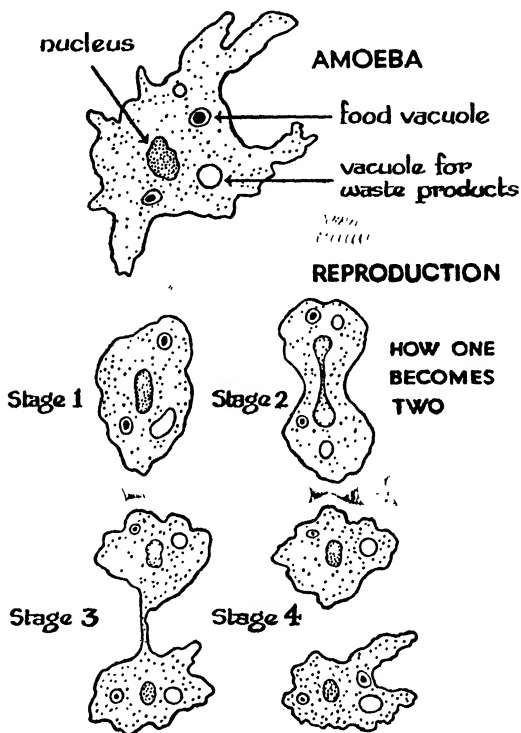


FIG. 2.

Surely we have here one clue to the vast secret of that amazingly intricate process of development which we call Evolution. A moment's thought tells us that once a creature was created capable of reproducing itself in this way the possibilities were endless.

When animal life first appeared on the earth, which may have been anything from 300 to 1000 million years ago, it was probably in some such simple primitive shape as the Amoeba: that is to say, it was a single cell without brain or senses (other than that of touch, perhaps). Once the process of life had begun, however, it grew and grew as a snowball does; and as it grew it changed—improved—evolving all those countless creatures which to-day people the earth.

As time went on simple animals like the Amoeba (or Protozoa as the zoologist calls them) became rather more complicated in their make-up. Instead of a unit-cell we find more intricate structures beginning to take shape, creatures composed of thousands and millions of cells united in such a way as to form a single organism. Some cells took on special functions. Some, as we have already noticed, became blood corpuscles; others nerves, others tissue, others flesh and bone. Instead of formless creatures we find the first signs of internal organs, then limbs, then a brain, beginning to take shape. In place of the humble Amoeba we find a gradual building up (or evolution) of bodily functions.

This is what I meant when I called this chapter the Ladder of Life. The Protozoa are at the bottom of that ladder just as Man is at the top, and we can trace the progress from one rung to the next. The first upward step was taken when such lowly creatures as the Sponges were evolved. Then came the Jelly-fishes, more highly complex, but still without any real power of self-locomotion. Possibly it took Nature over 100 million years to climb even this short way up the ladder. The next advance probably saw the emergence of species comparable with the Starfish, Sea-urchin, and Worms, which, though they were still quite brainless, had at least begun to develop a rudimentary digestive system, and were to some extent able to find their way about freely in their

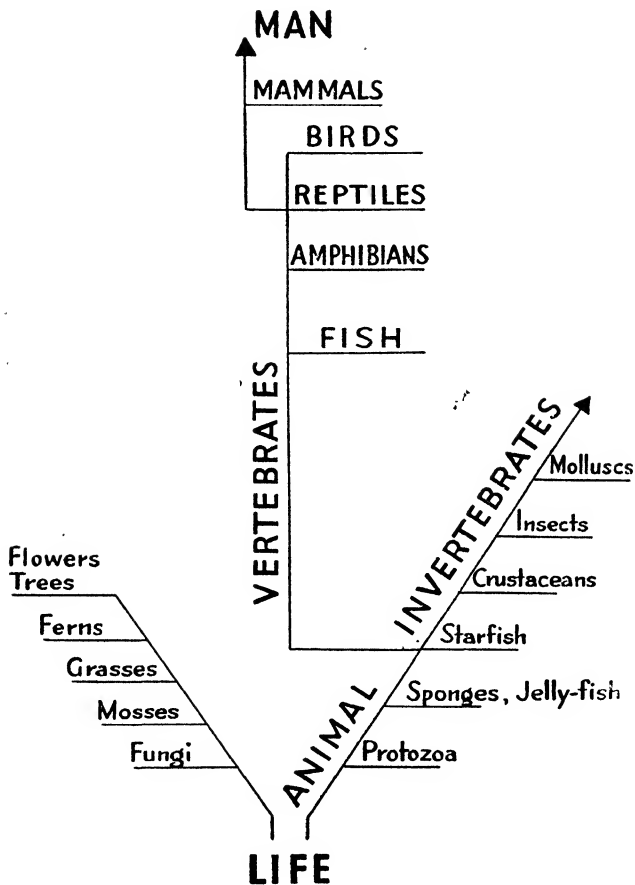


FIG. 3.—The ladder of life.

native element—water. After these, animals of a new type appear—those that had learned to protect themselves with an armour of bony material. These, the Crustaceans, carried their skeletons *outside* their bodies. Lobsters, Crabs, Shrimps, and other shell-fish are modern examples.

One of the most important steps that Nature ever made in the long and arduous ascent of the Ladder of Life was when she invented the backbone. Hitherto animals had been soft, jelly-like creatures. The growth of a spinal column (the vertebrae) now gave them a stronger framework for their bodies and, what was more important, enabled them to develop a far more sensitive nervous system controlled by a central organ (or brain).

The first vertebrate animals were still confined to the sea, whence all Life originally came: ancestors of our present-day fish. The next rung on the ladder is represented by the Amphibians, which for the first time left the waters in which they had been bred and ventured to seek a livelihood on dry land. How Fishes ever learned to breathe freely in air is something of a mystery; for, as everyone knows, Fishes extract their oxygen from water by means of gills. Possibly they started by rising to the surface and swallowing air in much the same way as the Australian Lung Fish do to-day.

From the Amphibians to the Reptiles proper is an obvious step. For many hundreds of thousands of years these horrifying monsters ruled the earth, long before anything like our idea of an 'animal' had yet appeared. The terrific Dinosaurs and unimaginable Sea Serpents roamed the swamps and coiled in the shallows. Huge as they were, they were all cold-blooded and hairless, and they laid eggs.

From the Reptiles we are ready to move up on to the topmost rung of the evolutionary ladder, for it was the Reptiles that gave rise to the highest forms of life yet known on this earth, the Birds, and, highest of all, the Mammals.

Birds, like the Reptiles from which they came, continued to lay eggs, but they were no longer cold-blooded, and to preserve their bodily temperature they were covered with feathers. The Mammals went further than this. Instead of laying eggs the females carried the young inside their bodies until they were ready to be born, and then cared for them until the offspring were ready to fend for themselves. For the first time we find something like true affection and intelligent behaviour beginning to show itself.

You see what I meant when I said that the Wolf, Lion, and Horse (and ourselves too) had developed from very humble origins? Perhaps, after all, I should have called my book *Wild Mammals of Britain*. It is a long way from the Amoeba to Man, but there is no break in the ladder that leads from one to the other, as the diagram on page 9 shows.

It has taken us several pages to discuss how animals came to be what they are. Still, it is worth while pondering a little before we begin, first in order to gain some slight idea of the ways in which development occurred; and secondly, because, as I said before, 'animal' is such a vague word. From now on you will understand that by 'animal' I mean 'mammal'. No other word is really quite adequate. 'Quadruped' will not do, because a frog has four legs and is not a mammal, whereas the whale has no legs and certainly *is* a mammal. Other writers prefer to speak of 'beasts', but here again the meaning is vague, and the word has, moreover, a somewhat unpleasant sound. Would you call the harmless mole or the gentle dormouse a beast? Hardly, I think.

This book deals with the life of mammals, particularly those of our own country. They are worth studying because of their interesting ways and their rare charm, but most of all because they represent some of the highest forms of life yet seen upon the earth. Man is without doubt at the very

top of the Ladder of Life—Nature's most finished masterpiece so far ; but there are other species not so far beneath him as to be beneath his notice. If Man is wise he will treat them with the respect they deserve, not as so much vermin to be slaughtered at will. Remember that man has been on this earth only for a paltry 40 or 50 thousand years : Nature has been hard at work for at least 300 millions—and probably a good deal longer than that !

CHAPTER II

ANIMALS—PAST AND PRESENT

THE earliest mammals, we discovered, began to appear sometime during the Age of Reptiles, many, many thousands of years ago. As might be expected, the first of these beast-like creatures retained many traces of their reptilian ancestry; they were still of a very low order of intelligence, and still laid eggs. The Spiny Ant-eater and the Duck-billed Platypus of Australasia are examples of primitive egg-laying mammals which have survived until the present day. So, too, though rather more advanced, are the Marsupials—the Kangaroos, Koalas, and Opossums—which pick up their half-formed young ones at birth and carry them in pouches; but since none of these is to be found in the Northern Hemisphere there is no point in discussing their habits in any detail. The wild animals of Britain belong, without exception, to a third and higher classification, the sub-class Eutheria of the zoologist.

What, then, are the features which distinguish the mammals (and particularly these so-called ‘higher’ mammals) from other animals, and wherein does their superiority lie? In the first place, they are invariably warm-blooded; they have lungs, a four-chambered heart, and a system of circulation very much like our own. To preserve their body-temperature they are protected by a covering of hair. (In the case of the whales and elephants—and, for that matter, man himself—this fur has to a great extent been lost, but traces of it are always present.)

In the second place, the mammal’s brain is large in proportion to the rest of its body, much larger and better developed than it is in any of the reptiles or amphibians.

(The dinosaur, for instance, weighed up to fifty tons, but its brain was no bigger than an egg.) The mammal, too, has projecting ears, a feature which marks it off from other vertebrates. True, the whales and some of the seals do not possess conched ears, but we know that they had them once upon a time.

Thirdly, there are marked improvements in the structure of the skeleton : for example, all mammals have prominent jaws and a set of graded teeth—molars, canines, and incisors, each of which is shaped according to its position in the mouth and the uses for which it is intended.¹ With reptiles, on the other hand, the teeth are all of the same shape.

Lastly—and this is by far the most important difference of all—the young of the higher mammals are fully formed at birth. That is to say, instead of merely laying eggs and leaving them (as most fishes and reptiles do), or incubating them in a nest (as birds do), the females hatch their babies *inside their own bodies*. They feed and tend them throughout the period of infancy. Whereas the newly born butterfly is perfect and fully grown, once its wings have dried in the sun, the offspring of a mammal is very often blind, naked, and quite helpless. For this reason it has at first to be nursed and fed on milk, which is secreted in the mammary glands in the mother's breast. Indeed, this is the explanation of the word 'mammal'—a creature that suckles its young.

Now just as there is a Ladder of Life connecting the lowest forms of animal life with the highest, so there is an ascending order within the class of mammals themselves. As the Duck-billed Platypus is a representative of the earliest egg-laying type (Prototheria), so Man as a species is a representative of the latest and highest sub-class (Eutheria). He is, if you like, 'the last word' in the evolutionary process.

¹ Here again we must except the Whales—but they provide a special case, as we shall see.

Throughout the ages mammals have gone on changing. Readers of *Wings of the Wild* may remember how the Snipe came to have a bill as long as its body through plunging it into the mud in search of its food. So it is with the mammals. Each has specialized in its own way. Some, like the Whales, took to living in the ocean, and have been doing so for such a time that they have almost come to look like fishes. You can see a similar development in the Seals, though in their case the transformation has not gone quite so far because they returned to a marine way of life at a much later date : they have not yet lost their hind-legs. More recently still, the Otter (which is closely related to the Weasel family) has taken to hunting in rivers ; and here again the same phenomenon may be observed. The Otter is literally in the process of becoming streamlined.

Other mammals fed mainly on grass—and from these there came such species as the Deer, Antelopes, and wild cattle of various kinds. Hunger drove some to prey on weaker mammals, and from these descended the various breeds of ferocious killers, the carnivorous mammals—the Lions, Wolves, Bears, and others. Some, like the Shrews and Moles, subsisted on insects, which were often plentiful. A million years ago, perhaps—maybe longer than that—it is possible to imagine a race of these little creatures jumping and clutching at midges or flies. Not content with picking them off the ground, they grew ambitious and tried to catch them in mid-air. Years went by, century after century, era after era, and still these nimble fellows kept leaping and waving their arms, until at last the skin between their arm-pits and fingers became so stretched, so elastic, that it formed a sort of wing. The jump became first a glide and afterwards a full flight. The fore-legs had developed into wings ; and so in the course of time we got the first Bats.

To be sure, this is a very crude explanation, but it will perhaps afford some idea of what probably happened. In

one way or another the mammals conquered air and sea as well as the land. Naturally those that went in for a high degree of specialization forfeited other attributes. When it came to walking, the Bat had to all intents and purposes lost the use of its legs. The Whale lost *his* completely. On the whole, those mammals that remained on dry land fared best and made the most remarkable progress.

Here, then, is a classified list of the Orders into which zoologists have divided the placental animals (Eutheria), those that are born straight from the mother's body and suckled throughout their infancy :

1. Armadillos.
2. Sea Cows. (Like the Manatee, which you may see in the London Zoo. A dull, sluggish beast.)
3. Cetaceans. (Whales, Dolphins, Porpoises.)
4. Ungulates. (Hoofed animals like the Horse, Ox, Elephant, Hippopotamus, Rhinoceros, Antelopes, Deer, etc.)
5. Rodents. (Gnawing animals in which the incisor teeth are of abnormal size. Rats, Mice, Beavers, Rabbits, Squirrels, etc.)
6. Carnivores. (Flesh-eaters like the Foxes, Wolves, Hyenas, Cats, Bears, and Seals.)
7. Insectivores. (Shrews, Moles, Hedgehogs.)
8. Bats.
9. Primates. (Lemurs, Apes, Human Beings.)

You will see at a glance that by no means all of these are represented on the list of present-day British animals. We have neither Armadillos nor Sea Cows, and (apart from ourselves) we cannot hope to study any of the Primates anywhere in Europe, unless at Gibraltar, where there are still a few monkeys left. Out of the whole vast Order of the Hoofed Animals this country can muster only three species—the Red, Roe, and Fallow Deer ; not a solitary

Antelope or Wild Horse, and certainly nothing to compare with such spectacular brutes as the Hippopotamus and Rhinoceros.

The truth is that the wild animals of Britain are now only a remnant of those that once inhabited our land. The fact that they have become so few does not, of course, make them any the less interesting ; but it is nevertheless fascinating to picture the strange and wonderful variety of hairy beasts and monsters that once roamed where now our modern cities and villages are built.

Mr. H. G. Wells once wrote a highly fanciful story which he called *The Time Machine*. Merely by pressing a button the inventor was transported backward or forward through the ages to any point in time that he cared to choose. Suppose for a moment that it were possible to take an imaginary trip backward in such a machine. Close your eyes and hold your breath, for here we go—back beyond the time of Nelson, beyond Queen Elizabeth, beyond William the Conqueror. A thousand years already—and our whirlwind journey has scarcely begun. On we speed, past the birth of Christ, past David, past Abraham (four thousand years)—far beyond the earliest dawn of civilized men. In a few moments no less than twenty thousand years have slid away, and out we step into an English countryside very different from that with which we are familiar. Gone are the roads and houses which we know so well. All round us is a dark, impenetrable forest, strange trees with clearings here and there filled with stretches of reed-swamp ; and just look at ourselves ! Without knowing it, we too have changed in the swift passage of time. We are half-naked, clothed only in rough skins, our hair long and unkempt, our faces more like those of apes than men. We have low, receding foreheads, thickset shoulders, and, worst of all, we can no longer speak our native tongue. All we can do is gibber and grimace to each other to show our horror and surprise.

Having recovered from this initial shock of surprise, however, let us dare to take a look at this landscape of pre-historic England. Perhaps it will be as well if we do not stir too far away from our Time Machine, for this great forest is full of the most dangerous monsters. There is a soft padding through the undergrowth, a terrifying roar—a snarl—and out slinks—a Tiger! Yes, an English Tiger, *only this one is*, if anything, more terrifyingly ferocious than the Bengal Tiger which you have seen at the circus or safely behind bars in the Zoo, for it has curved fangs at least six inches long. We breathe a sigh of relief as it passes by and disappears among the branching foliage; but this is only the first of our discoveries. Surely that rumbling in the glade is the voice of a Lion? And see, yonder in the open space, a sight still more alarming: a family of huge Rhinoceroses are browsing together. We can scarcely believe our eyes, for on their bony snouts they carry horns that are quite five feet long. And that dreadful howling in the distance—is it a Wolf or a Hyena?

By this time we are so thoroughly disconcerted that we are quite ready to jump back into the machine and return ourselves to the (comparative) safety and comfort of our twentieth-century existence; but before doing so let us dare to take one last look. That thunder and crashing in the heart of the wood, those mighty trumpetings—what else can it be but a herd of Elephants? And, sure enough, when they burst into view, thrusting the great boughs aside like willow-wands, we see that they are indeed Elephants. Thirteen feet high at the shoulders, clad in shaggy ginger-coloured hair, with upcurled tusks of yellow ivory, they blunder past. Mammoths! The earth shakes (and we with it!) under the enormous weight of their hooves. We have seen enough. . . .

Here we are, safely back again where we began, standing on the same spot and not a little thankful for having escaped

unscathed. Here once more is our home, our school, the civilized Britain of the twentieth century. Was it only a dream, this fantastic nightmare of strange and terrifying beasts? Could it ever really have been like *that*?

In fact, we know that this picture is very far from being fantastic, and that the wild life of this country was once far more spectacular than it is at present. Thirty thousand years ago England was joined on to the great land-mass of the Continent, and it was from Central Europe and Asia that most of our British animals originally came. They migrated westwards, which may explain why it is that such species as the Mole, Shrew, Bank Vole, and Weasel are not to be found in Ireland, for even in those days that country was already separated from England by the sea. It is in the eastern parts of England that most of the remains of prehistoric animals have been found. In the Forest Beds of Norfolk, for instance, the bones of more than thirty extinct species have been unearthed, including those of the Woolly Rhinoceros, Mammoth, Cave Bear, Elk, Lion, Hyena, and Sabre-toothed Tiger. Lions swarmed in most of our English counties, and the Giant Hippopotamus, bigger and more powerful than those that to-day live on the Nile, made its home among the marshes and reed-beds of Thames-side where London now stands.

The evidence for all this has been collected bit by bit, a rib-bone here, a broken tooth there. Students of archaeology have pieced it together so carefully that they can now reconstruct with fair accuracy these creatures of the forgotten ages. Sometimes they can form only a rough idea of what their actual appearance must have been; but in the case of the Mammoth we have been more fortunate. Indeed, to those who have not heard it already, the story of how the first of these long-since vanished monsters came to be discovered is well worth hearing.

Among the country folk of Northern Russia there had,

from time immemorial, been many tales of mighty beasts. Such tales are common property in the folk-lore of most nations. Who has not read of our own Saxon hero Beowulf and how he slew the monster Grendel? Few people took these stories seriously: they dismissed the monsters as creatures of the imagination like the fabulous unicorn and the dragons of fairy-tales. Then, one day more than a hundred years ago, a Siberian peasant came to town with a hair-raising account of a gigantic beast whose stature exceeded that of any known in the whole realm of the animal kingdom. He had seen it, he said, frozen in the solid ice, perfect in every detail. Of course, no one believed him. His story was considered too utterly improbable; but the truth of it was confirmed soon afterwards when a party of scientists set out to investigate. By careful excavation they laid bare the carcass of a full-grown Mammoth in a perfect state of preservation, so fresh that its flesh was still eatable despite the fact that it had been buried for so many thousands of years. The frozen peat of the tundra had acted as a natural refrigerator. The red hair remained on its body, and when the stomach was opened it was found to contain shreds of bark and shoots of fir-trees—the monster's last meal.

In spite of its vast proportions and terrifying appearance, however, the Mammoth seems to have been a tolerably harmless creature, and may have fallen an easy victim to the slings and spears of the early cave-men. In Britain it lingered until about 8000 B.C., possibly later still in Ireland. The last ones probably died out on the Continent before the time of Abraham. The Great Elk, a forefather of the dainty Fallow Deer which may be seen in Epping Forest and many of our great parks, survived even longer. So did the Reindeer, which, if we are to believe the written accounts of the Vikings, was still to be found in the north of Scotland as recently as the twelfth century.

What became of all these extinct animals? And why

trouble to discuss them here, seeing that they are no longer to be seen in these islands? Let me attempt to answer each of these questions in turn.

In the first place it must be understood that the climate of this country has undergone a series of drastic changes in the course of the last 30,000 years. Periods of exceptional warmth were followed by periods of intense cold. When the Polar ice-cap advanced southwards, creatures like the Lion and Hippopotamus, which had grown accustomed to milder temperatures, found themselves ill-fitted to win a livelihood under the new, unfavourable conditions. Either they perished altogether or they withdrew to regions more suited to their ways of living. Some, like the Mammoth, strove hard to accustom themselves to the arctic severity of the weather, but the odds against them were too great. We may well imagine how colossal the Mammoth's appetite must have been. Unable to find sufficient food, it subsisted for a time as best it could and finally succumbed.

There were other reasons. The immense bulk of the Mammoth was a disadvantage in itself. Those curly tusks, imposing as they were to look at, were of little use when it came to defending itself against ravenous packs of smaller and more active creatures, whether wolves or men. In short, the Mammoth had become a misfit. So, too, had the Great Elk. In some ways it was the most magnificent deer that the world has ever seen, but its spread of antlers—ten feet from tip to tip—must have been a sad hindrance at times. They had grown out of all proportion to their original purpose, which was to protect their owner in battle. It is easy to see that in their different ways both Elk and Mammoth had grown to be too cumbersome and top-heavy to compete with the new races of nimbler, more progressive animals. Accordingly they paid the price of extinction.

Whether or not this provides a full and perfect explanation of the disappearance of certain species, it certainly illustrates

the first and best-known ' Law ' of Evolution : that *only the fittest survive*. Nature has no use for freaks or misfits. Size and strength mean little to her. Only those species that contrive to find some way to adapt themselves to changing circumstances are left to carry on the race. Either they change themselves to suit the times, or they are ruthlessly exterminated. As they change, so they improve themselves, but so gradually that a very long time may elapse without the improvement becoming noticeable. Those characteristics that are likely to help the animal in its fight for existence are retained. Those that are of no use to it are (or should be) dropped. This is what Darwin meant by the Principle of Natural Selection.

Which brings us to the second question : Why have I thought fit to write about these extinct creatures in a book which professes to deal with the wild animals of Britain as they may be seen to-day ? Why conjure up the past ? The reason was not, as some may think, to make the reader envious, but to give some idea of the changes that have taken place. Some reference to the past was necessary, if only to show how one species has its day and then gives way to another. In a way it is true to say that one race of animals changes into another, moulded by the hand of Time.

Of all the lessons that Evolution has to teach this is the greatest—that the essence of life is change. We, the people of twentieth-century Britain, are not *quite* the same kind of people as our grandparents were. The wily Fox which you may see to-morrow is slightly different from the Fox of Shakespeare's day ; not much, perhaps, but nevertheless different. We have seen the startling changes in our animal population which the past 20,000 years have produced. We may be quite sure that in the next 20,000 years the changes will be equally startling. The Ladder of Life is still not climbed. Indeed, the metaphor here becomes

inadequate—for it is a tree rather than a ladder, its branches continually reaching out into the Unknown. Day by day the evolutionary process is feeling its way to an ever-elusive perfection, always trying new experiments, never static, never the same from one minute to the next. Once we have really learned this lesson we may begin to look on Nature with more discerning eyes. We need to remember what has happened in the past in order to understand more clearly what is happening in the present. Surely this is the true meaning of that much misused term, Natural History.

CHAPTER III

BRITISH WILD ANIMALS

AT the end of this chapter there is an orderly list of all the British wild animals described or mentioned in this book. You will find it useful when you come to read the later chapters.

But, you ask, what *is* a British wild animal? It would be quite ridiculous to pretend that extinct species such as the Mammoth or Sabre-toothed Tiger were British in any real sense of the word. They belong to the prehistoric period. On the other hand, there are a number of species which might still be included in our list were it not that they have been exterminated in comparatively recent times. The Brown Bear, for instance, was common enough up to the time of King Alfred. The Beaver was sawing trees and building its river-dams until well into the Middle Ages, and in the wilder valleys of Wales and Scotland it survived until the sixteenth century. The Wild Boar, which is still hunted in France and Spain, was not unknown in Shakespeare's boyhood, and Wolves did not disappear from the English woodland until the reign of Henry VIII. If contemporary records are to be believed, the last British Wolf was slaughtered in Ireland some time towards the close of the eighteenth century.

It is quite clear that these losses were not in any way concerned with natural causes such as brought about the destruction of the Mammoth, and that had it not been for human intervention Bears, Beavers, and Wolves would still be classed as British animals. As these islands became more and more the centre of a great civilization all the wild animals had to reckon with a new and deadly enemy—Man

himself. The Bear was dangerous to travellers ; the Wolf attacked sheep ; the Boar raided crops ; the Beaver was a nuisance, blocking the waterways. Each in its turn was ruthlessly eliminated. Of the larger breeds only those that lived by stealth and cunning contrived to escape destruction, such as the night-faring Badger and sly Fox.

Yet, though Man has proved himself a tyrant in many ways, he has also been the means of introducing several *new* species from abroad. Most of the animals on our list have been natives of Britain from the earliest times. Some, like the Mole, were resident here even before the advent of human beings. We call these the *indigenous* species. But there are others, including some that are now very common, which were originally not British at all. The Brown Rat, for example, has only been here for a mere two hundred years ; and its predecessor, the Black Rat, was unknown before the Norman Conquest. The Rabbit, too, is an immigrant : some historians think that it was first brought to this country by the Roman invaders, and it was certainly uncommon until long after 1066.

Other cases of animals being introduced have occurred within living memory. The Grey Squirrel is a familiar sight scampering about in our public parks or sitting on a rail to beg for biscuits. This North American species was first released in England some seventy years ago, since when it has multiplied at such a rate that we now accept it as a recognized feature of the countryside. Of still more recent date is the dreaded Musk Rat. This large rodent—it is about the size of a Rabbit—was first imported from the United States less than twenty years ago for the sake of its valuable musquash fur. Though the animals were kept in captivity, one or two escaped from the fur-farms and began to breed in a wild state. Soon the numbers of these fugitives began to grow ; they found their ways into rivers and canals and did considerable damage by tunnelling and undermining

embankments. In a few years they threatened to become a serious menace, increasing at such an alarming rate that in 1933 a special Act of Parliament had to be passed to ensure that their numbers were kept strictly under control. Thanks to this the danger was averted ; but the Musk Rat serves as a standing warning against human interference with the affairs of wild animals.

No doubt Man *was* justified in wiping out the Wolves and Bears, but it must be confessed that by his indiscriminate persecution of every furry creature and by his introduction of foreigners he has in many ways made a sorry mess of our national wild life. In a word, he has upset the Balance of Nature. Those foreign species which have settled down and established themselves in this country we must accept as 'British wild animals' ; but we cannot help thinking that they are a poor recompense for those that have gone. Many of our nobler hunters are now reduced to a pitiful remnant, driven to live in desolate places where few of us can see them (like the rare Pine Marten, which is still trapped and shot because it is deemed guilty of taking young Pheasants). Stoats, Weasels, Polecats, Badgers, and others have been classed as vermin and slaughtered wholesale—and then farmers complain that their land is overrun by those foreigners, Rabbits and Rats !

In other ways Man has been more fortunate in his experiments with wild animals. Naturally this book will have nothing to say about domestic species—the pet Dog or fire-side Cat—nor those that are more necessary for human welfare—Horses, Cattle, Sheep, Pigs, and Goats. Pre-historic man seems to have had an uncanny knack of taming certain classes of wild animals and making them serve his purpose. The wild Dog was indispensable for hunting just as the moorland collie is to the shepherd of to-day. The Horse was broken-in and set to work at the plough. The savage Oxen were penned in fields, their flesh and milk

invaluable as food supplies. It is worth while pausing at times to consider how dependent we are on animals of this kind. Our shoes are made of leather, our clothes mostly of wool. Dinner would be a poor meal without meat; even our arm-chairs are stuffed with hair. All told, we owe a tremendous debt of gratitude to those pagan ancestors of ours, possibly the Neolithic men, who first succeeded in imposing their will on wild creatures. For all the astounding inventions of modern civilization, it is rather remarkable that modern Man has not succeeded in adding to our list of common domestic animals. On the contrary, he has, in his ignorance, been the cause of a great deal of thoughtless meddling in the ways of the wild.

Any creature that has at any time come under the direct influence of human beings may be said to have forfeited its right to be considered a wild animal. Domesticity is at best an artificial life, and its effects are handed on to succeeding generations. The purring tabby may retain traces of his savage ancestry, and instances of 'gone-wild' Cats are very frequent; but no one should make the mistake of confusing these runaways with genuinely wild species. For the same reason, this book has nothing to say about animals that were once tame but which at one time or another have returned to a free and independent life of their own. Perhaps the best known example of these is the so-called Wild White Cattle, descendants of herds of Oxen which escaped from their keepers many centuries ago and have since led a sheltered existence on such great estates as Chillingham Park.

Not long ago I had brought to me the remains of what was supposed to be a Polecat. At first inspection, indeed, it looked very much like a genuine wild Polecat, but on closer examination it proved to be nothing more than a ferret that had broken loose and taken to the fields. In a country such as England is to-day one must be careful to

discriminate between these four types—domestic breeds ; animals that have ‘ gone wild ’ ; species that have been introduced, either directly or indirectly, by the hand of Man ; and lastly (most important from our point of view) the indigenous species.

In future we would do well to look on British wild animals with kindlier eyes. It is not so much that Man has been cruel to them as that he has been thoughtless and foolish because of his ignorance. England, certainly, is the poorer because of his wanton behaviour towards them. Our native fauna is a precious heritage and must be preserved at all costs. No wild creature should be shot or trapped in these islands unless a very good reason can be given for doing so. Of course, Rats must be destroyed, and it is right and necessary that Rabbits should be kept within proper limits (and if we suffer because of these pests we have only ourselves to blame—after all, it was we who first brought them here). With these exceptions, it is wrong for us to interfere in any way with the lives of wild animals. Their struggle for existence is hard enough without our adding to their difficulties. The life of the wild is a life apart, with laws and customs that are not our own ; but in its way it is a noble, pure existence, and the least we can do is to respect its privacy. The Pigmy Shrew or the Harvest Mouse has as much right to live as you or I. Besides, to do mischief to any wild animal is wrong simply because it is so wilfully stupid. Man is not yet so wise that he cannot learn a great deal from the ways of the furry folk. If instead of wishing only to destroy, he seeks to watch and understand them, he will find much to wonder at—and more to admire.

CLASSIFIED LIST OF BRITISH WILD ANIMALS

(Those marked with an asterisk (*) have been introduced from abroad.)

ORDER : CETACEA.

(a) *The Whalebone Whales.*

Blue Whale. *Balænoptera musculus.*

Lesser Rorqual. *Balænoptera acuto-rostrata.*

Common Rorqual (or Fin Whale). *Balænoptera physalus.*

Humpback. *Megaptera nodosa.*

(b) *Toothed Whales.*

Pilot Whale. *Globicephela melæna.*

Killer (or Grampus). *Orcinus orca.*

False Killer. *Pseudorca crassidens.*

Sperm Whale. *Physeter catodon.*

Bottle-nosed Whale. *Hyperoodon rostratus.*

(c) *Dolphins and Porpoises.*

Common Dolphin. *Delphinus delphis.*

Bottle-nosed Dolphin. *Tursiops truncatus.*

Porpoise. *Phocæna phocæna.*

[This list of Cetaceans is not intended to be comprehensive. Altogether, there are no less than 23 species on the British list, but of those not mentioned here the majority are casual or accidental visitors only.]

ORDER : INSECTIVORA.

Hedgehog. *Erinacus europæus.*

Mole. *Talpa europæa.*

Common Shrew. *Sorex araneus castaneus.*

Pigmy Shrew. *Sorex minutus.*

Water Shrew. *Neomys fodiens bicolor.*

(Also sub-species : *Sorex granti*, the Islay Shrew, and *Crocidura cassiteridum*, the Scilly Shrew. This latter is a representative of a different Genus : the Continental white-toothed shrews.)

ORDER : CHIROPTERA.

(a) *Earlet Bats.* (Family : Vespertilionidæ.)Pipistrelle. *Pipistrellus pipistrellus.*Noctule or Great Bat. *Nyctalus noctula.*Leisler's Bat. *Nyctalus leisleri.*Serotine Bat. *Eptesicus serotinus.*Water Bat. *Myotis daubentonii.*Bechstein's Bat. *Myotis bechsteinii.*Natterer's Bat. *Myotis nattereri.*Whiskered Bat. *Myotis mystacinus.*Long-eared Bat. *Plecotus auritus.*Barbastelle. *Barbastella barbastellus.*(b) *Leaf-nosed Bats.* (Family : Rhinolophidæ.)Horseshoe Bat. *Rhinolophus ferrumequinum insulans.*Lesser Horseshoe Bat. *Rhinolophus hipposideros minutus.*

ORDER : CARNIVORA.

(Family : Canidæ.) Fox. *Vulpes vulpes.*(Family : Felidæ.) Wild Cat. *Felis silvestris grampia.*

(Family : Mustelidæ) :

(Sub-Family : Lutrinæ.) Otter. *Lutra lutra.*(Sub-Family : Melinæ.) Badger. *Meles meles.*

(Sub-Family : Mustelinæ.)	{	Weasel. <i>Mustela nivalis</i>
		<i>nivalis.</i>
		Stoat. <i>Mustela erminea stabilis.</i>

[*M. e. stabilis* denotes the 'Common' Stoat. Two sub-species, *M. e. ricina* (inner Hebrides), and *M. hibernica* (Ireland and Isle of Man) are recognized.]

(Sub-Family : Martinæ.)	{	Polecat or Fomart. <i>Mustela putorius putorius.</i>
		Pine Marten. <i>Martes martes martes.</i>

- (Family : Phocidæ.)
- | | |
|---|---|
| { | Common Seal. <i>Phoca vitulina</i> . |
| { | Atlantic Grey Seal. <i>Hali-chærus grypus</i> . |

ORDER : RODENTIA.

(a) *Double-toothed Rodents.**Rabbit. *Oryctolagus cuniculus*.Brown Hare (English). *Lepus europæus occidentalis*.Blue Hare. *Lepus timidus scoticus*.Irish Hare. *Lepus hibernicus*.(b) *Single-toothed Rodents.*Red Squirrel. *Sciurus vulgaris*.*Grey Squirrel. *Sciurus carolinensis*.Dormouse. *Muscardinus avellanarius*.*Edible Dormouse. *Glis glis*.*House Mouse. *Mus musculus*.St. Kilda Mouse. *Mus muralis* (probably extinct).*Black Rat. *Rattus rattus*.*Brown Rat. *Rattus norvegicus*.Field Mouse. *Apodemus sylvaticus sylvaticus*.Yellow-necked Mouse. *Apodemus flavicollis*.Harvest Mouse. *Micromys minutus*.

Also the following sub-species :

A. s. butei (Bute).*A. s. hebridensis* (Outer Hebrides).*A. s. hirtensis* (St. Kilda).*A. s. fridariensis* (Shetlands and Fair Isle).Field Vole or British Grass Mouse. *Microtus agrestis*.

Also divided into five sub-species :

(1) *M. a. hirtus* (England and Scotland).(2) *M. a. neglectus* (Central and North Scotland).

(3) *M. a. exsul* (Hebrides, other than those *infra*).

(4) *M. a. mial* (Eigg).

(5) *M. a. macgillivraiensis* (Islay).

Bank Vole or British Bank Mouse. *Clethrionomys glareolus britannicus*.

Divided into four sub-species :

(1) *C. g. britannicus* (Southern Mainland).

(2) *C. g. alstoni* (Mull).

(3) *C. g. erica* (Raasay).

(4) *C. g. skomerensis* (Skomer).

Orkney Vole. *Microtus orcadensis*.

Water Vole or English Water Rat. *Arvicola arvicola amphibius*.

(Also *A. a. reta*, a smaller, darker form found in the Highlands.)

[The Orkney Vole affords a fascinating example of the subtle changes in size, structure, habits—in short, everything which goes to the evolution of species—produced by the isolation of island life. Thus each of the five main islands of the Orkneys group has its own sub-species: *M. o. orcadensis* (Mainland), *M. o. ronaldshaiensis* (Ronaldshay), *M. o. rousaiensis* (Rousay), *M. o. westrae* (Westray), *M. o. sandayensis* (Sanday), which illustrates the lengths to which zoologists will go in order to differentiate between all but identical forms; a thankless task, surely, for the gradations are never-ending, so slight as often to be imperceptible. At least, in this instance, one cannot help feeling that the trinomial system of terminology is in danger of ending in a *reductio ad absurdum*.]

ORDER : UNGULATA.

Red Deer. *Cervus elaphus scoticus*.

Roe Deer. *Capreolus capreolus thotti*.

? *Fallow Deer. *Dama dama*.

CHAPTER IV

FUR AND FANG

FUR is to a wild animal what feathers are to a bird—its most treasured possession. Here and there you may come across a mangy Fox or a hairless Rabbit—diseased individuals—but these are most exceptional. The great majority are always careful to keep themselves in a state of scrupulous cleanliness. Just as a bird has recognized times for bathing and preening, so the dirtiest sewer Rat must lick and brush its coat at regular intervals throughout the day.

There is another point of resemblance between the plumage of birds and the fur of animals. Everyone knows that feathers are moulted at certain seasons and that a new set of quills is grown each autumn and spring; but it is not always realized that mammals change their coats twice yearly in much the same way. At the beginning of the year they shed the thicker covering which has protected them throughout the winter and adopt a lighter, cooler dress more suitable for sunnier days. In most cases the change is accomplished so gradually as to be quite imperceptible to human eyes, though one or two species (the Pine Marten is one) shed their winter coats very rapidly, sometimes almost overnight, as a snake sloughs its skin. Very often this new fur is scarcely to be distinguished from the old, for the difference in colour is usually not very remarkable. It is obvious only in a few animals such as the Stoat and Blue Hare, in which the change-over to a complete white dress affords a startling contrast; but it should be remembered that the process affects *every* species.

As a general rule, the winter fur is duller than that worn during the summer months. From a rich, foxy red the

Roe Deer fade to a mousy grey, while the Fallow Deer lose their dappled white spots and go about in a dun-brown uniform—as though they know that their drab colouring will serve them better for concealment when the woods grow bare and shadowy.

Fur, as we call it, consists of three distinct kinds of growths: (1) those which are soft and curly, matting together when damp—commonly known as 'wool'; (2) those which are long, producing a smooth surface when combed—or 'hair'; (3) those which are stiff and wiry—

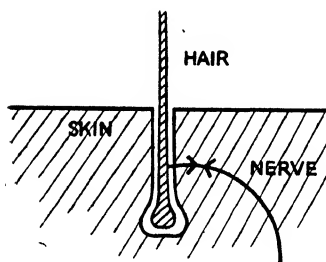


FIG. 4.

'bristles'. Most animals have an undercoat of wool, corresponding to the down of birds, and an outer coat of hair. The softer parts, like the eyebrows and the naked muzzle, are always protected by bristles. These, as the diagram shows, are connected with nerves at their roots, which makes them highly sensi-

tive and useful for a number of purposes. Have you ever wondered why Mice and Weasels should have such prominent whiskers? It is to help them to feel their way along the narrow underground burrows in which a great part of their life is spent. How else could they judge the width of a hole in the darkness?

Every animal has wool, hair, and bristles as part of the make-up of its fur, but the proportion varies from species to species according to its wearer's needs. In Bats the limbs are quite naked, the body being clothed in finest, silky wool. The Hedgehog, on the other hand, is clad almost entirely in bristles. Seals have given up their woolly undervests in favour of a waterproof coat of close hair.

In contrast to the gaudy feathers of birds, animal fur is notably lacking in bright colours. Moreover, far from reflecting the brilliant rays of the sun, it absorbs them, thus giving what photographers call a 'matt surface', and ensuring that the animal retains its natural colour even in the brightest light. There are no pure reds or blues or yellows, only neutral shades of tawny and umber, as befits creatures that are to a large extent earthbound. Even black is used sparingly, and where white occurs, as in the Rabbit's scut or those conspicuous tail-patches in Deer, it serves either as a mark of recognition or as a danger-signal, as we shall see later.

In nine cases out of ten it is true to say that mammals are darker on the back, palest on the underparts, with intermediate shades on their sides, producing a uniform effect which tends to make them inconspicuous in most situations. This same phenomenon may be seen in birds and fishes. Whenever an apparent exception is to be found, some fairly obvious explanation usually presents itself. The Mole's fur is bluish-black all over, but as it spends most of its time underground there is very little need for it to be disguised in the normal way. Some of the Bats have pure black stomachs, but why not, in view of their peculiar habits? Anyone seeing a Badger in a museum case might be forgiven for thinking that it defied all the rules of camouflage: light above, sooty below, and its snout so obviously striped with black and white! But how different it must appear to the view of smaller grubbing beasts as it snuffs along in the moonlight!

Here, very briefly and generally, we may consider the interesting question of protective coloration and some of the problems suggested by it. The Giraffe with its checker-board pattern exactly matching the sun-flecked leaves; the Tiger with its vertical stripes that resemble the scorched grass in which it prowls; the Grey Seal with its humped

back looking like a wet boulder of basalt—these are three outstanding examples of natural mimicry. In camouflage of this kind the animal's appearance is so effectively adapted to that of its environment as to render it almost invisible. Similar instances are provided by many of our British animals.

Until they are fully grown and fleet of foot the young fawns of Roe and Red Deer are covered with pale whitish spots, which produce a curiously dappled effect, confusing to the eye when seen against a background of foliage. It is significant that when they grow up and the need for this kind of protection is not so great, these juvenile markings are lost. Foxes which live on the rock-strewn fells and lakeland hillsides are invariably shaggier and greyer than lowland Foxes. The Blue Hare is slate-coloured and harmonizes so perfectly with its surroundings that even the shrewd eye of the eagle cannot spy it out as it lies cowering in full view among the stones. On the other hand, its near-relation, the sandy Hare, is equally well concealed as it gallops across the ploughland and flaxen stubbles. The Water Vole on the bankside looks like a ball of mud.

But there is a second type of natural camouflage, that in which the colouring of the fur is so broken up that the eye is distracted and fails to see the animal as a whole. Most striking of all is the strangely irregular patterning of the Killer Whale, in which the whole body is splashed unevenly with black and white. The effect of this dazzle-pattern is bizarre, most bewildering, creating an illusion of bits and pieces. It provides the same sort of effect as when an expert camouflage artist covers a factory with weird zig-zags and oblongs of paint. In both instances the results are identical—the enemy is confused—though in the case of the Killer it must be admitted that the aim is unconscious. Anyone seeing the Badger in the moonlight or a Fox poking his ginger-and-white mask through a screen of branches

would be puzzled for a moment. He would see a conspicuous patch of colour but not *the shape* of the whole figure ; and while he was still trying to piece it together the animal would have taken fright and bolted.

The more one studies them in their favourite haunts the more one becomes lost in admiration at the various subtle ways in which wild creatures are fitted to lead their lives, and the devices which they have adopted in order to elude notice.

If the fur of animals may be said to have toned itself to suit their surroundings, it is equally true that their internal structure has been shaped and influenced by what they eat and the ways they eat it. Where food is concerned mammals are much the same as ourselves : they need a balanced diet of proteins, carbohydrates, fats, mineral salts, and vitamins to keep them well nourished. But the ways in which these essentials of good health are obtained vary enormously. In order to maintain its strength the Rabbit must be continually nibbling, whereas a Weasel can manage comfortably on one meal a day. It is a fact that there is far more food-value in an ounce of raw meat than in a pound of most greenstuffs. As a consequence you will find that, as a class, the vegetarians are stouter in appearance than the flesh-eaters. Contrast the pipe-thin body of the Weasel with the plumpness of the Rabbit. As the latter consumes large quantities of grass its intestines are relatively much longer, and as they take up more room inside the body they give it a somewhat bulky appearance. Ruminant species, like the Deer, have lithe, muscular legs and exceptionally large bodies, the reason being that they have more than one stomach in addition to the great length of bowels so typical of plant-eating animals. They take their fill of grass but do not immediately digest it, for Deer are nervous creatures and must always be on the alert to make a hasty getaway. If they are startled in the midst of their browsing

they are often forced to make a dash for safety. Afterwards, when they have regained their composure, they are free to chew the cud in peace, and it is not until then that the food is transferred to the second stomach.

In the same way the shape of an animal's teeth has been determined by the food it consumes. Carnivorous species have long-bladed fangs with prominent curved canines. Their teeth are knives. Insect-eaters like the Shrews and Bats have sharp spiky teeth—needles rather than crushers. The Rodents are still more specialized : their middle pairs of front teeth (the incisors) have developed into chisel-like cutting tools, excellent for gnawing but useless for other purposes. As they rarely eat flesh they have entirely lost their canine teeth : their food is bitten off in lumps and passed back into their mouths to be ground into a digestible mass by the molars.

There is not sufficient space here to discuss all the intricate differences of teeth arrangement and skeleton structure, marvellous as they are. They are best studied in the flesh, from actual specimens. For each peculiar feature, no matter how small or trivial it may seem, there is a reason and an explanation. Time and again we are led to realize how the process of Evolution embraces everything that concerns an animal's welfare. The shape of its head, the length of its tail, the size of its jaws, its daily habits, even its temperament—these and a thousand other details have been determined for it by a line of ancestors extending far back into Time. Generation after generation, each species goes on adapting, modifying, perfecting itself for the way of life which is peculiarly its own ; each generation adding its own slight improvement so that those that succeed it are better able to meet their environment and better equipped to carry on the stern, unending struggle to survive.

CHAPTER V

ANIMAL MIND

HAVE you ever wondered what it must feel like to be wild animal—a Hedgehog, say, or a Hare? We cannot even imagine what the sensations of the lowly worm may be, still less those of the Amoeba. They move, therefore they must presumably be aware of what goes on around them; but since they have no brains, their experience of the world must be very, *very* vague. But the behaviour of the higher orders of mammals resembles our own in so many ways that we are probably right in believing that their experience is to some extent comparable with human experience. In other words, their actions suggest that they have minds—of a sort. This is not to say that their minds are *like* ours: in certain respects they may even be superior; but it must be remembered that their outlook is far more limited and their actions far more impulsive than are ours.

In the first place their lives are largely governed by instincts—those inborn powers which enable an animal to do things without needing to learn how to do them and which prompt it to follow certain prearranged courses of action. Here we must be on our guard against thinking that instincts are the peculiar characteristic of the lower animals and that they do not play an important part in shaping human conduct. They most certainly do. Instincts cause us to be curious, to go exploring, to fight our enemies, to fear danger, to collect and make things, to fall in love, or to fly into a passion; but in human beings natural impulses are kept more or less in check by the exercise of intelligence. We behave, so we say, reasonably—or at least we should try to do so. No one admires the boy who

loses his temper on the slightest provocation or who wants to fight everyone he meets merely to assert himself : we say that his character is lacking in control.

Animals are rather like such a boy. They follow their impulses blindly, allowing their instincts to take charge of them without making any attempt to check them by reasoning. Someone once called them ' little children who never grow up ', and the comparison is apt ; for throughout their lives they behave as little children do—always busy but rarely stopping to think.

Can animals think ?

Yes and no ; it depends on the type of animal. Species belonging to the higher Orders are certainly not unintelligent, but we should hardly expect the insignificant brain of a Shrew to be capable of serious thought. Thought involves the capacity of turning over a problem in the brain and of working out a solution. When Nipper, my terrier, finds himself locked out he will bark for me to let him in, will tug at the bell-pull, or, if that fails, go round to the back of the house to see if there is an alternative door open. Experiments with Rats in mazes and in specially constructed boxes have shown beyond doubt that they soon learn to find their way out, and that they remember their ' lessons ' for several weeks at a time. Most animals profit by their past experiences and are capable of learning as a result of trial-and-error methods. In other words, if one thing fails they try another until they get what they want. This implies some measure of intelligence, but in the main it is true to say that they use their brains only as a last resort. Instinct is the great force that directs their lives and shapes the pattern of their habits. So long as they can get enough to eat they do not much trouble themselves with whys and wherefores. Instinct prompts them to follow a more or less regular daily routine, and unless things go wrong there is really small need for them to *think*.

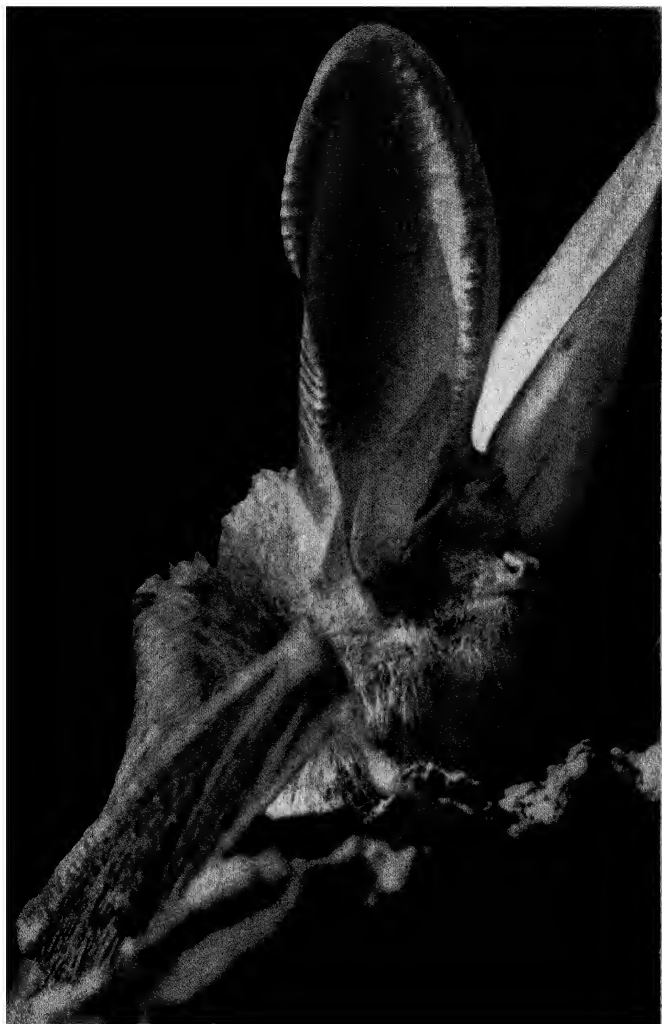


PLATE IV

LONG-EARED BAT.



PLATE V

Above. POLECAT.

Its resemblance to the familiar ferret is obvious.

Below. YOUNG WEASEL.

We might express it this way : that an animal's experience is made up of sense-impressions and feelings rather than of thought. It has the same five senses that we have, only we know that in some cases the impressions it receives from them are far more vivid than are ours at the best of times. Generally speaking, its hearing is more acute, and its sense of smell infinitely more powerful. In the human nostril there is a delicate membrane, measuring less than a quarter of an inch from side to side, by means of which the nose detects some of the scents that the air carries. In the Red Deer the area of this patch is fifty times as large. We cannot smell the Deer as they graze unseen a quarter of a mile ahead of us ; but the Deer can smell *us*, if the wind is in the right direction. Before we come into sight they are gone.

Some people believe that animals possess a ' sixth sense ' ; and whether this is true or not, it is certain that they react to many stimuli of which we are wholly unconscious. They are as sensitive to weather changes as is the barometer. Maybe you have seen the moorland Sheep come down from the hills before the approach of a great snowstorm. Mice and Voles become very restive when the atmosphere is thundery : no doubt they can feel the electricity bristling in their fur. Some species are more affected than others, but all are influenced by sudden changes in climatic conditions. One day they will be in the highest of spirits, another will find them sluggish, skulking in corners.

How are we to account for the wonderful nimbleness and agility of wild animals ? Inside the human ear there is, attached to the back of the brain, a delicate organ that controls the sense of balance. In view of the splendid confidence with which wild animals carry themselves, we must believe that in them this instrument is far more perfectly developed than it is in men. Possibly, too, it has something to do with their almost miraculous sense of

direction. A Harvest Mouse, no bigger than a man's little finger, will wander through cornfield after cornfield, clambering from stalk to stalk, and yet return unerringly to its nest. Could *we* be so sure of finding our way back home in such a forest ?

Because of their specialized habits, some species have more or less lost the use of one or other of their senses. The sea-going Whale has little use for ears ; the miner Mole has become practically blind ; but in every case of this kind you will observe that other faculties have been developed by way of compensation—new senses of which we know little or nothing.

As animals rely so strongly upon their instincts we might expect them to be highly emotional, and so in fact they are. No doubt they feel the same anger and fear, the same gladness and anxiety, as we do—only more intensely. Their range of feeling, however, is more limited : such feelings as laughter or shame or vanity are unknown to them. They are never ' self-conscious '. Moreover, they do not show their feelings in quite the same ways. A frightened Vole will grind its teeth ; but it is terror, not rage, which causes it to do so. The love-lorn Seal will grunt at his mate in a manner which suggests the vilest bad-temper, but it is only his way of showing his affection. Facial expressions may be very misleading. The ' grin ' of a cornered Rat, the ' innocent ' look of a Fox, the wrinkled features of a Bat, and the Red Stag's roarings express emotions at which we can only guess. Here, as in all our observations, we must be on our guard against thinking that animals behave in exactly the same way as human beings. If we do that, we shall certainly interpret their actions quite wrongly.

At most times of the year animals seem to behave in a very level-headed sort of way, going about their business in a quiet, orderly manner, as if they took life very much for granted. Many of them are curious or even inquisitive

when confronted with something new or something which they do not understand. Apart from one or two solitary species, they enjoy each other's society ; but most of the time they are too busy looking for food to show any signs of outward emotion. It is only when the mating and breeding seasons draw near that they become really excitable. Then passions begin to run high—rage, jealousy, devotion, and sheer *joie de vivre*—but we shall be talking about that in the next chapter. For the moment it is enough if we realize that animals are as capable of feeling joy and sadness, pleasure and fear as we are ourselves ; only that in their case such feelings come and go very quickly, leaving little or no trace behind them. A wild creature may feel sorrow or temporary disappointment, but it does not brood on past misfortune. It feels pain, but it endures it without flinching, and does not think about it afterwards. It may fly into a towering fit of rage on what seems the slightest provocation, but next moment it has forgotten all about it.

Though they must be always on the watch, ready for surprises, we must not think that wild creatures are perpetually haunted by fear. Once the danger is past it is dismissed from the animal's mind. Its nerves are taut, like a trigger that needs only a touch to set it off, but there is nothing akin to the nervousness or 'worry' of human life. The timid Rabbits scatter at the first gunshot, and five minutes later half of them may be fast asleep in their burrows.

After food and drink, sleep is the greatest necessity of an animal's existence, but the amount required varies from species to species. A dog may survive without food for a fortnight, but if it is deprived of sleep for four or five days it dies. Even in summer the Badger will snore away fifteen hours and more at a time, while the Rat can manage quite well with two or three. Horses and Deer can go to sleep quite comfortably while standing on their four legs. Do they dream ? Dogs growl in their sleep, and I have seen a Fox

twitching his tail uneasily as though his slumbers were disturbed by some sort of visions. Generally, however, we must believe that animal sleep is blank forgetfulness—pure oblivion.

We often speak pityingly of the 'poor dumb animals'. True, they have no language in the sense that they speak to each other by means of words and sentences. At the most they have only one or two sounds—call-signs, warning-notes, exclamations—but this does not mean that they are incapable of communicating with each other. The single squeak of a House Mouse, uttered in various pitches and with significant changes of emphasis, conveys a thousand different meanings, every one of which will be understood by its fellow-mice. It may sound gibberish to us, and yet be quite a conversation for those who can interpret it. And there is a language of looks also. Silent species, like the Rabbit, converse together in this way. The attitude of the head, the angle at which the ears are cocked, the facial expression, convey a meaning without the need of any spoken words. We often say that we can read a person's thoughts by his gestures or by the look in his eyes. Long before he tells us what is in his mind we know whether he is dismal or happy, bored or excited. Knowledge of this kind is called intuitive: we receive it directly without needing to have it explained to us. In animals intuition has become such a fine art that to a large degree it makes up for their lack of articulate speech.

All things considered, we must agree that the picture we get of the mammal's mind is a pleasant one—thoughtless, free from anxieties, completely healthy, always enjoyable. Young animals prove it by the way they romp and play—it is an essential part of their early education—and many an old one loves to join in the fun. Others are frolicsome to the end of their days. The aged vixen rolls on the floor with her cubs; Stoats run roundabout races; Squirrels

perform trapeze acts in the trellised branches ; Dormice sit in a row enjoying the sun, like fat old gentlemen snoozing after a heavy meal. These furry folk may be capricious, creatures of merry whims, but there are times when their pleasures are so obviously akin to our own that we cannot fail to sympathize with them.

Just one word more. Later chapters of this book will attempt to describe the habits of the various *species* ; but it is as well to remember here and now that these descriptions can never be more than general. Each individual, whether mouse or man, has his own peculiar habits, his private likes and dislikes. The lowliest creatures are not machines ; they do not obey any fixed rules. Some are bold and some are shy. Each in its little way has its individual character just as much as you or I have.

CHAPTER VI

FATHERS, MOTHERS . . .

IT is midnight in January, moonless but, clear, the sky powdered with thousands of sparkling stars. The air is frosty, promising snow, and a strange hush lies over the land, for the last owls have long since left off hooting. I open my bedroom window and look out into the darkness, hoping, half expecting, to hear that numbed stillness broken by the noise of some mysterious night-farer.

And suddenly, from across the fields, comes a short, gruff bark.

Yap, yap . . . yap, yap ! 'Not unlike a terrier,' I think. Then silence.

A pause. I wait, and then, after a minute or two, hear the call repeated, this time from another direction, much farther away ; and while I am still listening a weird, unearthly scream rises upon the night air : a high-pitched squall that quavers eerily up and falters, falling away into silence as though its utterer were in agony, dying in a gasp. . . .

I smile and close the window. The Foxes at their love-making again ! That dreadful wail is the voice of the vixen luring her suitors on through the darkness, telling them of her whereabouts.

At any other time of the year no one would ever guess that there were any Foxes in this district. They are very careful to keep themselves to themselves, always silent, slinking about after nightfall unseen and unheard. Only during the season of their courtship do they care to advertise their presence—and for obvious reasons. At this season

the dog Foxes will forsake their usual haunts and travel many miles in search of a mate. For a few short weeks they give themselves up more or less completely to the task of finding, wooing, and winning a wife. Competition grows fierce, for one vixen may have as many as half a dozen males pursuing her and vying with each other for her favours. What is the source of this tense excitement which suddenly, in the dead midwinter, infects the Fox and causes such a reversal of its usual habits? This change of behaviour is no passing fancy; it marks the onset of new interests, the opening of a new and vital phase in a life that has hitherto been self-seeking and solitary.

The tendency to become vocal and to go a-roving is common to all wild animals when the urge to breed possesses them. Even the stay-at-home Mole sets out underground and trespasses in the territories of strangers; and when he encounters one there is invariably a tussle to decide the right-of-way—a tussle that often develops into mortal combat. Hares chase each other and box together in the open fields, while the does sit by demurely waiting for the contest to reach a decision. In the life of the wild courtship is a most serious affair, and fights to the death are far from rare. Still, we must not take it that the victor always prevails by sheer force: the female has *something* to say in making the final choice.

Mammals may not indulge in quite such extravagant displays as birds, but it is quite clear that a show of valour and vigour goes a long way towards achieving the result that the male desires. Only those individuals that are in the prime of life are accepted by the females. The young and immature and those that are too old to breed are rigorously excluded from taking part in the courtship ceremonies. A Rat may breed at the age of six months, but a Red Deer must wait until it is six years old before it is fully capable. Only those that are perfectly fit are allowed to rear families.

In this way, each species ensures that its future stock does not become diseased or feeble.

Birds lay their eggs and hatch their chicks during what is a more or less fixed period. With most of the smaller mammals the breeding season is likewise in spring and summer. With some of the larger species, however, it is impossible to lay down any definite rule in these matters. As everyone knows, human babies may be born in any month of the year. Grey Seal pups, on the other hand, are born at the beginning of winter—at what seems to be just the worst season of the year. Discrepancies of this kind are apt to be puzzling at first: they cannot be resolved without taking into account a number of complex circumstances affecting the life-cycle of each particular species.

One factor to be borne in mind is the length of time that elapses between the parents' first mating and the actual birth—the period when the embryo is developing inside the female's body. In the tiny Shrew this period of gestation, as it is called, lasts only two or three weeks; but it takes eleven months with the Grey Seal and well over a year with a Whale. A moment's thought will show that whereas the Shrew is free to produce a number of litters in the course of a twelvemonth, species belonging to the higher Orders are much more restricted. Badgers, for instance, are supposed to breed only once in every three years. This partly accounts for the fact that while some species are amazingly prolific, others are (and must, by the nature of things, remain) far less numerous.

(Food-supply is another factor that must be taken into account where population is concerned. One acre of heathland will support a horde of Voles or Field-mice, but an area of several square miles may be needed to supply the special requirements of a Fox or Badger.)

Do animals pair for life in the way that our fathers and mothers do? Some do, but the great majority do not.

Once they are paired off and have mated together, Weasels, Badgers, Otters, and Hedgehogs seem to remain faithful to one another, in other words, the sexes remain together in season and out of season for the rest of their lives. The Fox, on the other hand, though he is passionately attached to his vixen for a month or two, soon tires of her and goes off on his rounds, preferring to hunt alone. Hares take a new wife each year. When autumn comes, the two sexes go their separate ways and probably never meet again.

So far we have taken it for granted that each pair formed a distinct unit, one female to one male, but there are exceptions to this state of affairs. Though each individual is more or less bound by the pattern of instincts which governs the species to which it belongs, it follows its desires without any sense of personal obligation. There is no question of right and wrong in the animal world—nothing comparable to the human code of morals. Species that live in crowded colonies (Rabbits and Common Seals, for example) are liable to indulge in any amount of confused love-making. The sexes mingle one with another so freely and indiscriminately that it is impossible to say who is mated with whom. The males may take several mates in turn, even in a single day. When the time comes for their young ones to be born, the females withdraw from the crowd, and from then on perform all the nursery duties themselves, without receiving any assistance from a partner. Behaviour of this kind is said to be *promiscuous*.

Stranger still is the courtship of such species as the Grey Seal and Red Deer. Early in autumn the great stags trek across the glens to gather as big a collection of hinds as they can muster. Not satisfied with one, they must have twenty, thirty—half a hundred wives. Uttering a roar so thunderous that it may be heard two miles away, the champion defies any rival who may be within earshot

to dispute his possession of such a harem. Sooner or later a lone stag is sure to take up that challenge. When that happens a terrifying conflict ensues. Heads down, the two stags charge furiously at one another, their antlers crashing together like quarter-staffs ; nor is their wrestling given up until one or the other is utterly vanquished. Meantime, the hinds, who have been following their lord and master as obediently as slaves, await the issue of the struggle for supremacy. It may be that the newcomer is victorious and their old stag driven to headlong flight. The winner takes all. Fifty wives at one fell swoop ! Animals of this kind are said to be *polygamous*.

Obviously there are wide differences in the family lives of wild animals. Here and there you will find a Darby and Joan—pairs which come together and live happily ever after. There are the gay Lotharios, Don Juans, and Casanovas who woo where and when they can, leaving the female to rear the young ones by herself and caring nothing for the consequences. There are romantic sheikhs, like the dashing Red Deer stag. Ceremonies there may be, but no marriage laws ; therefore there can be no rule of thumb to govern their wild loves and affections.

In the great majority of cases, the duties of nursing and feeding the family fall heavily on the mother. Usually the male takes little or no interest in the welfare of his offspring. Sometimes he is so jealous or ill-humoured that he would actually destroy them if he were not prevented from doing so by the ever-watchful female. Stories are told about boar Badgers murdering their own cubs, and maybe there are old and cross-grained individuals who *will* behave so unnaturally, given the chance. But it is only fair to add that ' Mr. Brock ' more often makes an excellent father, one who will fight to the last in defence of his little ones. As with human beings, so with animals, we must make allowance for individual differences. Even in the same

species it is always possible to find some that make model husbands while others just do not care in the least.

Nevertheless, it is roughly true that the male's share is much less important than the female's. The doe Rabbit lays her litter away from the mischievous bucks, where none may touch them except herself. The male Wild Cat is taught to keep his distance from the lair and not to interfere. He may never be allowed to set eyes on his kittens until they are three or four months old.

To the female, on the other hand, the cares of family life mean a great deal. Her whole life is devoted to tending her young ones. The maternal instinct is universal. The dirty Rat, the Pigmy Shrew, and the monstrous Whale become the most devoted of mothers, suckling and caressing their naked infants, and mounting guard over them until they are strong enough to fend for themselves. The Bat clasps her baby against her side and carries it aloft on her flights. Mrs. Hare picks up her leverets by the scruff and carries them one by one, depositing each in a secret place known only to herself. Dame Otter stays in or near her river holt for four months, going without food for days at a time in order to look after her whelps. The young ones must be fed, washed, and kept warm. Everything must be done for them. Later on when they have to be weaned from their milk diet and taught to feed themselves it is the mother who is their teacher. Sometimes the father may lend a hand by supplying her with food or by mounting guard himself, but *his* work is nothing compared with hers.

When the time comes for her young ones to be born, the female goes off on her own, having previously chosen some secluded spot where she feels she will be secure from interference. There she prepares the nursery, makes it snug and safe, and waits for the happy event to occur. Prettiest of all these cradles is the nest of the Harvest Mouse, slung daintily between three cornstalks. Far down in the

innermost recesses of the 'sett' the sow Badger digs a private chamber which she lines with straw and dead bracken. Underground homes are in great demand with many animals ; but the young of Deer and Hares are laid on the bare earth, though always well hidden with thick undergrowth. Some Squirrel ' dreys ' look obvious enough, but though you climb up to a hundred of these winter nests you will not find one that is occupied ; the breeding ' drey ' is always tucked away from prying eyes, either in the depths of an evergreen or in a cleft in the trunk. Very different is the bare couch of basalt or granite on which the baby Seal is born ; and still more spartan is the infancy of the Whale, delivered on the restless floor of the sea.

So long as the young ones remain dependent upon her, the female gives them all the attentions they desire. For her this is a very anxious period, and under the stress of strong emotions she may become quite desperate. It is common knowledge that birds will often desert their nests the moment they sense that something is wrong. Many a wild mother will eat her own children for that very reason. To us it seems a horrible thing to do, but to a wild creature at her wits' end, crazy with fear, it may be one way of saving the young ones from what she thinks may be a still worse fate.

Wild mothers take every precaution to ensure that the whereabouts of the nest *remains* a secret. The vixen knows better than to lie all day in the den : she sneaks out before dawn and returns to feed her cubs after dusk. The doe Hare is most careful to leave no tell-tale tracks behind her when she comes to suckle her leverets. Whenever she visits the ' form ' where they lie in the grass, she takes a round-about course, doubles back on her tracks, then, as she nears the place of concealment, finally takes a huge sidelong leap. Her motives are obvious—to break the continuity of her scent and to confuse any prowler that may be following

in her tracks. Red Deer hinds and Fallow does are equally cunning in concealing their fawns. The hungry Stoat, tired of having to remain in her hole, goes even farther : she will take her youngster with her on a hunting trip, carrying it in her mouth and dropping it in a corner when she sights a ' kill '.

But here we begin to wander from the affairs of ' Fathers and Mothers ' to those of the little ones themselves—an interesting subject, and one which demands a chapter to itself.

CHAPTER VII

. . . AND CHILDREN

THE higher we go on the Ladder of Life the longer does the period of immaturity tend to become. A butterfly is fully grown the moment it leaves its chrysalis. The fledgling bird is ready for life after a few short weeks of preparation. The human being, on the other hand, spends twenty years as a juvenile, almost a third of his lifetime.

Just as, in the last chapter, we found a bewildering variety in the behaviour of parent animals, so we must be prepared to find an equally wide range of difference in their young ones. There is a world of difference between the new-born Shrew, which is scarcely as big as a bee, and the infant Whale, which may weigh as much as an elephant. The day-old Mouse is already four times as heavy as it was at birth, but it takes a Red Deer fawn three months to double its weight. As a rough general rule we may take it that there is some correspondence between the period spent as a juvenile and the age and size to which the full-grown animal ultimately attains. The smaller species have litters that often number a dozen or more at a time, and their rates of growth can only be described as mushroom-like. The larger species produce only a single young one at a birth and develop much more slowly.

At birth all young animals are quite helpless. Those born undergrown are usually blind, deaf, and utterly naked. Were it not for the careful attention they receive they would very soon die. In Rabbits, Badgers, and Wild Cats the eyes remain closed during the first ten days, and this is a fair average for the length of this infantile blindness ;

though Otter whelps do not see the light of day until they are more than a month old. Very different are those young born in open, exposed situations. Leverets are open-eyed and clad in fur from the start. So, too, are Seal calves and Deer fawns, though the latter are so delicate that they lie on the bare earth for a week before they are strong enough to stand on their four legs.

Once it has entered the world the youngster's main needs are sleep and food. At first the only nourishment it can take is that which it obtains from its mother. Its first instinct is to suck, and apart from that and the desire to keep warm, it remains inert. As it gains in strength it gradually becomes more and more active, and by the time its eyes open it is ready to take an interest in what is going on around it. Perhaps it wishes to wander off on its own or to fight with its brothers and sisters ; but the watchful mother checks it, nuzzling it gently beneath her. *She* knows that rest is the first essential. As a result we find that most young animals develop a layer of 'puppy-fat', a storehouse of energy for the strenuous days that lie ahead. At this stage in their careers they are clad in their first juvenile coats, the colours of which may be very different from those of their parents. In the chapter called 'Fur and Fang' we remarked that all Deer fawns were covered with spots and noted the reason. Fox cubs have darker coats than their parents for the same reason—to protect them during this dangerous period when they are forced to remain so long in the same place.

As the young animal grows it begins to exercise its limbs. Consequently it requires more and more food, until at last its mother can no longer supply all its needs from her own body. Now comes the process of 'weaning', when the baby is gradually taken off its milk diet and introduced to more normal foods. Young Rabbits quickly take to eating grass, but most Bats are suckled for at least two months,

and the Grey Seal's calf cannot be tempted to touch even a morsel of fish until it is seven months old.

Once it is weaned the young animal has made the first step towards achieving its independence. However, there is much for it to learn before it is fit to go hunting on its own account. Those that lead a simple and primitive way of life like the grass-eating Rabbits, the Shrews, and Mice, may be ready for the fray in a few short weeks, but for the higher Orders the interval of waiting is more protracted. We must not suppose that life comes easily to these beginners or that they can go out into the world guided solely by instinct. Otter whelps and Fox cubs, to mention only two, must first undergo a period of intensive training before they are ready to follow the hunter's trade. When it comes to the simplest and most necessary activities they are either awkward or completely helpless. The arts of walking, climbing, and swimming have to be learned by laborious practice, always aided by one or other of the parents, usually the female. At first the youngsters have little or no control over their own muscles—they blunder and totter about, sprawling like drunkards. They do not know how to judge even the shortest distances ; they cannot recognize danger even when it is close at hand ; they are apt to be noisy at the wrong time. All these faults have to be remedied by following and imitating the parents. Ignorance of this kind is only overcome by careful and patient teaching. The Red Deer hind taps her calf with her hoof to bid it lie still. The vixen cuffs her venturesome cub when it tries to run on ahead. The Badger nips hers shrewdly in the flank until the little mite fairly loses its temper—and then rolls and wrestles with it to show it how to fight. It is a rough-and-ready upbringing, maybe, but effective. There is a great deal of loving care but no pampering : there are no ' spoilt ' children in the wild.

How to lie low, how to recognize danger-signals, how to



PINE MARTENS.



THE BADGER IS GUIDED BY ITS,
NOSE RATHER THAN BY ITS,
EYES IN CHOOSING A SITE,
ON WHICH TO DIG.

THE FOX LIVES BY
ITS WITS.

PLATE VII

track down their prey, how to put each of their wonderful senses to its full and proper use, how to keep themselves clean, how to defend themselves—all these and a hundred other secrets have to be learned before the young ones can safely leave their mother's side. That is why in autumn one frequently sees bands of what seem to be fully grown animals moving about in close companies. The Hare is a solitary species and the Fox, Weasel, and Stoat usually hunt alone ; but at harvest time you may see four or five of them faring afield together. These are, in fact, family parties. The yearlings may be practically undistinguishable in appearance from their parents, yet they continue to follow them. They are well aware that there is still a great deal to be learned and that they can profit from the expert experience of their elders. No doubt they would be content to remain hangers-on like this for an indefinite period ; but sooner or later the parents grow tired of their presence and drive them away.

How does the young animal learn all this ? Very much as we do—by watching others, by being curious about things, most of all by play and imitation. All young animals are full of high spirits, always skipping and gambolling as though they could never tire—never a dull moment in their early lives. Contrast the bounding lamb with the staid sheep or the frolicsome foal with the heavy stallion. The yearlings are so eager, so full of energy, that they are always ready for a game ; and this, though you may not have realized it, is an important feature in their later development. Play is the means by which they exercise their brains as well as their bodies. The kitten which frisks after a dead leaf, pouncing and letting it go again, is, however unconsciously, teaching itself to catch mice or birds. It is, if you like, a game of make-believe, but a game that will shortly have a more serious purpose.

Knowing this, many animals spend much time in sporting

with their children. The bitch Otter flips her tail at her whelps to have them seize upon it and then snatches it aside, to teach them to be quicker next time ; or she allows them to worry it, twitching it away when they grow too rough. Who knows ?—possibly her tail is more than a plaything to them. As it squirms to and fro it looks for all the world like an eel, and it is upon the eels they catch that these young Otters will have to live once they are grown up. All the various sham fights, the quarrels and thoughtless fun of these early days in the nursery may seem to us to end in nothing. The kitten quickly forgets its leaf ; the young Badgers leave off their tussling with the sow ; the Otters tire of playing with their dam's tail ; yet all the while they are gaining strength and skill. They do not know it, but these games form the main part of their early education—an introduction to the sterner business of their later life.

CHAPTER VIII

WINTER LIFE

ONCE their families are safely reared and launched in the world, the problems that face most animals cannot be said to be very numerous. Old and young settle down to a quieter routine, the more normal day-by-day business of winning a livelihood and avoiding their enemies. First in importance for all is the necessity of finding a regular food supply ; and as most species are now finished with nursery duties they are at liberty to roam wherever they will, to devote all their wits and energies to the struggle for existence.

And indeed it is fortunate for them that they *are* free in this way ; for of all the four seasons in the year, winter is the one that is most beset with difficulties. Food of all kinds is becoming increasingly scarce, involving longer and longer treks overland—and this in itself involves a greater effort than during the lazy, easy days of summer and autumn. Since more energy is used up and because the weather is so much colder, more food is required to keep the bodily machine going. As provisions grow scanty appetites grow keener. Therefore the wild animal's main activity during the winter is very much concerned with solving the problem of how to get enough to eat.

Does this seem to overstate the facts ? It occurs to you, perhaps, that the Grey Seal does not begin its courtship until the late autumn and continues to suckle its young one throughout the winter ; but, then, you must remember that fish are plentiful at any time of the year. On the other hand, Otters, which feed mainly on frogs and freshwater eels, produce their litters early in spring so that by the time

winter draws near the whelps are strong enough to provide for themselves. What would happen if they left *their* breeding-season until October or November? By that time most coarse fish, eels, and amphibians have already sunk into torpor and lie buried in the muddy riverbeds. If the young Otters were born at such a time the results would probably be disastrous. The prospect of starvation plays an important part in shaping the yearly time-table and the daily habits of all wild creatures. The Grey Seal is merely the exception that proves the rule.

For one or two species the difficulty is more acute than it is for others. Some, like the Rabbit, have very simple requirements ; they can carry on without much interruption in their communal life. Under mild conditions they may even continue to breed in mid-winter. For security's sake the Deer assemble in mixed herds. But for most of the carnivorous beasts there is no safety in numbers, for, with so many of the smaller animals disappearing underground, the chances of a kill become more and more remote. The hunter is compelled to forage alone and to travel farther afield in search of its prey.

This suggests the first of three ways in which animals solve this all-important problem of the food supply. Many of them become nomads. Being so much more earth-bound, they cannot make such amazing journeys as those undertaken by the Swallows, Cuckoos, Terns, and other migrants which travel thousands of miles to the warm south. They may not actually migrate, but they can and do change their quarters. The Red Deer which have spent the summer ranging over the high summits of the Grampians are driven to seek sanctuary in the lower valleys. So, too, are the Wild Cat and Pine Marten : unable to endure the severity of the heights, they are forced into the sheltering trees. When the upper reaches of the rivers are solid in ice, Otters move downstream in search of open water, often

wandering as far as the tidal estuaries. Armies of Field Voles appear, as if by magic, millions of them together, often in places where they were practically unknown before. Evidently they have been attracted there by the presence of food, for when the provisions are exhausted in one locality the multitudes disappear as suddenly as they came. It is a gipsy life they lead, camping by the wayside wherever conditions are favourable, and then passing on : a day-to-day and hand-to-mouth existence.

Most people have heard the story of the Lemmings, those queer little rodents from Northern Scandinavia that travel in follow-my-leader fashion over rivers and mountains. Impelled by some mysterious wanderlust, they cover vast distances, and often their movements are so extensive that they can only be described as mass-migration. Once their journey is begun nothing will stop them or cause them to deviate from their course. On reaching a boat moored in the middle of a lake, the leader has been known to clamber over it, the others following, and plunge in on the other side rather than make a detour. And, strangest of all, when at last they reach the seashore the Lemmings are still not dismayed—they continue grimly on their south-westerly course as though determined to swim the 400 miles of ocean separating Norway from the British Isles. Thousands upon thousands have been seen to perish in this mad attempt ; and still the suicidal march goes on. Why should they sacrifice their lives in this futile way ? Because the urge to migrate is irresistible. Long ago this country was connected with the Continent, and the ancestors of these present-day Lemmings were doubtless in the habit of travelling south-westwards during the winter months. The wish to follow this age-old highway is still bred inside each one of them : a good example of instinct overpowering intelligence.

It is true that the Lemming's is an extreme case and that

there is no British mammal in which the migratory impulse is so strongly marked. Nevertheless, the need to be constantly on the move is felt by many species. In hard weather Foxes appear in places where they are usually unknown, raiding poultry in city suburbs. Weasels and Stoats, half-crazed with hunger, grow bolder and more desperate than ever.

A number of species have adopted a second method of overcoming their difficulties. To eke out the scanty provisions obtainable during the hard season they stock up their larders in autumn when supplies are most plentiful and easily got. The Squirrel's passion for collecting nuts is too well known to need any comment. Rats and Mice, too, are in the habit of building up stores in this way. Having made them they retire into their burrows to sleep, comfortable in the knowledge that there will be some sort of snack close by them when they awake. Instead of spending their energies like the nomads, they remain inactive most of the time, dozing away until the return of better days. If the weather relaxes a little they may stir abroad to see what they can find, but so long as hard times continue they remain 'indoors'.

In this country winter is rarely so severe as to make life actually impossible. When the snow lies heavy on the land the vegetarians may be hard pressed, but at the worst there is always *something* to be had. Rabbits, unable to penetrate the frozen layers, gnaw off the bark at the base of trees. Hares take to the turnip fields. It is only during the most prolonged and bitter frost that famine completely overtakes them and their numbers are sadly thinned. The majority soon accustom themselves to meagre rations and frugal fare, growing leaner and tougher as the ice sets its seal on the land.

But what of the fruit-lovers and insect-eaters? For them food of any kind is quite unobtainable. How can they live without it?

This question brings us face to face with the problem of hibernation, the last of the three methods by which the winter animal achieves survival. At first we may wonder why the strong-winged Bats do not fly southwards like the summer birds. Though they are quite capable of sustained flight, they are evidently not fitted for a purposeful and protracted journey of many hundreds of miles ; and in any case, the shuffling Hedgehog can have no hopes in that direction. The hibernators have chosen to escape the rigours of winter in another way. How ?

Before attempting to explain the wonders of hibernation let us first see what actually happens. First the Dormouse. In summer this miniature rodent is the liveliest little fellow, scurrying, leaping, and swinging like a trapeze-artist among the hazel shrubs, never still for an instant. He is fond of fruit of all kinds, berries, nuts, and various grubs and insects. By the end of September he is so sleek and fat that he can scarcely move. (*His* stores, you see, are kept inside his own body.) At the first touch of frost he curls up snugly in his nest, pulls the covering over him, and falls into a deep sleep—a sleep of the dead. The temperature of his blood falls ; his breathing becomes so imperceptible that to all intents and purposes it may be said to have ceased altogether. Nothing can disturb him, not even his tail being pinched. His body is quite stiff and cold. So he remains until the return of spring, when he creeps out, his skin wasted and shrunken—a shadow of his former self—but alive and eager to resume his life at the point where it left off in the previous autumn. For the Dormouse, winter simply does not exist.

Bats are more spartan. They build no nest. Instead, they seek out some secluded shelter and there hang themselves upside down in rows, like bunches of sage in a grocer's shop. Like the Dormice, they become perfectly rigid. Their breathing grows slower, their heart-beats weaker,

their skin bloodless and pale. They look like shrivelled husks, scarcely to be distinguished from the cobwebs draped about them. Their torpor is complete. We might almost say that, for the time being at any rate, they had ceased to exist.

The great French naturalist, Fabre, has given the simplest and best explanation of this phenomenon of hibernation. He likens all life to a fire. Before the fire can burn it must have two things to feed it—fuel and air. So must our bodies. When the fire is well supplied with fuel and air it burns freely, and must be replenished at regular intervals or it will quickly die out. Supposing, now, that instead of letting the fire burn itself to ashes you wished to keep it alight for several hours *without adding fuel*. What else would you do but bank it with ashes and shut all doors so that there were no draughts? Instead of fierce flames there would then be only smoke, with the red-hot inner core of the fire hidden from view. In this way it would go on burning for a very long time—dully and feebly, no doubt, but nevertheless burning.

Something very much akin to this occurs in hibernation. Having stored up reserves of fat (the fuel), the Dormouse and Bat go off into a deep trance, in which their bodily activity (the fire) is reduced to a bare minimum. Their breathing (the draught which normally fans the fire) almost ceases. The only energy used is that which maintains the pulse, and this, as we have seen, is very slow and feeble. The heart, like a motor which has been running at full throttle during the summer months, slows down and is left to 'tick over' so gently that its movement is scarcely noticeable.

Satisfying as such an explanation may be, there are some features of hibernation that still puzzle the biologist. As everyone knows, the blood heat of most animals remains tolerably constant throughout their lifetimes, and we are

all painfully aware of what happens when it rises or falls above or below a certain level. A few degrees too high and we are confined to bed with a raging fever. A few degrees too low and we are soon on the danger list. Not so with the hibernators. Their temperatures fall to within a few degrees of that of the surrounding atmosphere without producing any ill effects. How heavy and deep their slumber must be, almost like death itself !

Clearly this change could not take place unless the character of the blood itself were to change ; and so, in fact, it does. Mammalian blood is composed of two distinct kinds of minute cells, the red and white corpuscles as they are called. Though less numerous than the red, the white corpuscles are particularly important because it is they that destroy any germs that find their way into the blood-stream. In hibernation these white corpuscles are withdrawn from the outer arteries to be concentrated in the stomach and intestines, where they arrest any decay or infection that might otherwise set in during the long winter sleep. Naturally the animal itself has no conscious control over this process, any more than we have when we fight to overcome an illness. It is indeed a miraculous provision on the part of Nature, and one that can only be explained in terms of some mysterious power at present beyond our human understanding.

Hibernation is not, of course, confined to mammals. Many of the other vertebrates—tortoises, lizards, frogs, and fishes—undergo a transformation to all intents and purposes identical with that which overtakes the Dormouse, Hedgehog, and Bat. It is probable that these latter have retained the habit from their prehistoric ancestors—the reptiles from which the mammals are ultimately descended. As a whole, this phenomenon may be said to be characteristic of the lower Orders of animal life. In spite of popular belief Squirrels are only partial hibernators, and

though so intelligent a fellow as the Badger is fond of burying himself alive for long periods, his sleep is never so prolonged as that of the true hibernators.

There are, then, these three methods of overcoming the dangers of winter—by wandering, by storing, by sleeping. Each in its way is effective, but the hibernators' method of escaping the season's miseries is the most remarkable of the three. Blizzards rage and the snowdrifts pile their heavy mantles over moor and field. The half-starved Hare 'limps trembling through the frozen grass'; the bird is frozen on its perch; while human folk crouch round the fireside, blue and nipped in the face, complaining of chapped hands and chilblains. But for the fortunate Hedgehog these troubles do not exist. Hidden in his hole, he waits for the kindlier touch of spring to arouse him, blissfully unconscious of the hardships and sufferings of those who remain awake to face the icy blast.

SECTION TWO

CHAPTER IX

THE OCEAN-GOERS (WHALES AND PORPOISES)

‘**T**HERE she blows ! There—there—there—there she blows—she blows !’

‘Where away ?’

‘On the lee-beam, about two miles off, a school of them’ . . . meaning, of course, Whales ! What a thrill the crew must have felt, hearing that sonorous shout from the crow’s-nest telling them that after long weeks of sailing their quest was ended, the monsters were sighted at last. From very early times these great sea-beasts have captured the imagination of men, and whale-hunts of one sort or another have been organized in Europe for almost a thousand years.

Probably you have never seen a living Whale, and unless you take a journey by sea you are scarcely likely to do so. Possibly you are wondering why a special chapter has been devoted to them here. Maybe you are thinking that they are not, strictly speaking, British animals at all ; yet the Cetaceans, to give them their scientific name, are just as much a feature of our island fauna as the Rodents, Bats, or any of the others. You may be surprised to learn that the family comprises more species than any other on the British list, for no less than twenty-six kinds of Whales, Dolphins, and Porpoises have at one time or another been observed around our coasts. It is impossible to say just when or where we are likely to see them—they turn up in the most unexpected places—but the chance of seeing one or more of them cannot be ruled out entirely.

When I was a boy at school I had a very curious experience. I had received and accepted an invitation to spend a night at sea, fishing for mackerel. It was a beautiful evening late in July when we set out, the waves very calm, and as the smack chugged out from the harbour I remember wondering whether I would be sea-sick. The sun went down into the Irish Sea in a red blaze of light ; behind us the mainland

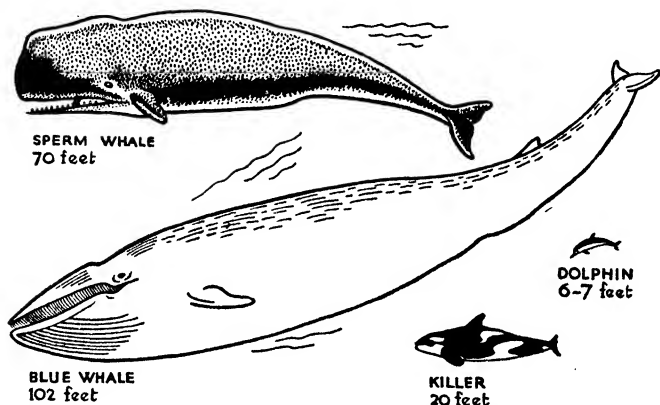


FIG. 5.—Comparative Sizes.

rose, pale and misty in the twilight. The two old salts, Sam and Joe, were busy preparing the bait, sorting out the lines and all the rest of their intricate tackle. No one said much.

I was leaning on the gunwale, watching the furrow of foam, when suddenly, a few yards off on the port side, the water was heaved aside and without warning a great black shape rose silently out of the depths. A broad, sinuous back, so sleek that it looked like oiled ebony, rolled into view and slid back under the waves. As it dived it gasped—and so did I—and almost at once a number of others surfaced and went plunging over into the swell. For a few

moments the boat was surrounded by dozens upon dozens of these ghostly charioteers, all sighing and whispering among themselves in the most weird fashion.

'Sea-hogs,' grunted Sam disgustedly, and began to haul in the first of the fouled lines.

Those were my first Porpoises. Since then I have seen other members of the Cetacean family, and on each occasion I have been haunted by the peculiar fascination which their strange shapes and mysterious mode of life so strongly evoke. A bare glimpse is all we get—just enough to startle us into wonder. Like creatures from some other world, they emerge for a moment from the Great Unknown, enigmatic as the sea itself, and then are gone, carrying their secrets with them.

Whales belong to the lowest of the nine Orders of placental mammals. They are quite distinct in themselves and there is nothing quite like them in the rest of the animal kingdom. Their origin and history are largely a matter of conjecture, but it seems fairly clear that they emerged from some tribe of early carnivorous beasts, lizard-like quadrupeds which long ago left the land and returned to live in the great waters. Their prototypes are probably to be found in such prehistoric species as the lizard-like *Ichthyosaurus* and *Zeuglodon*, fossil remains of which have been found in many parts of the world. As a result of the change-over from a terrestrial to an ocean-going existence, the Cetaceans have not only lost the use of their hind limbs, their hair, and their sense of smell; they have developed faculties and features which are peculiarly their own. They serve as outstanding examples of the ways in which animals adapt themselves to, and are moulded by, their environment. In shape they have grown so completely fish-like that we are apt to forget that they are, in fact, hot-blooded animals more closely related to ourselves than they are to the true fishes.

Suppose we take a look at a typical Whale and see just what has occurred. First, the flippers. At first sight these appear to be nothing more than paddles, indistinguishable from fins ; but if you examine the skeleton you will see that they are indeed arms, with all the wrist-bones and fingers preserved intact. There are, however, no traces of legs ; only a pair of hip-bones that have been left suspended in the lower part of the body, quite disconnected from the

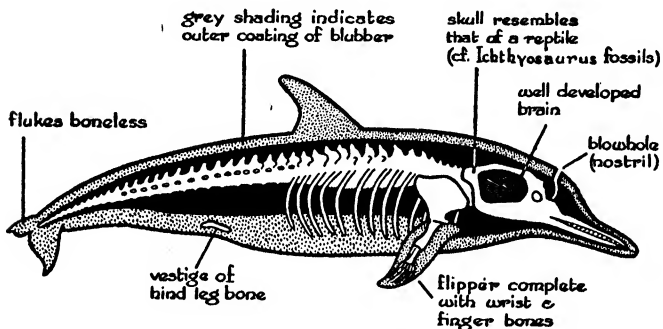


FIG. 6.—Structure of the Dolphin.

backbone. These relics, embedded in the monster's bulk, provide us with an important clue to the Whale's ancestry, proving beyond doubt that it was once a four-footed animal. Evidently the first Whales found their long tapering tails of more use than their hind-legs, with the result that the latter degenerated and finally disappeared altogether. What we call the tail is in fact nothing more than a double flap of muscle and gristle, used in much the same way and for the same purpose as the paravanes on a submarine. The flukes, to give them their proper name, lie horizontally in the water, not vertically as do the tails of fishes.

Next, the head. This is often of enormous proportions. The brain itself is not particularly large in comparison with

the owner's size but it is tolerably well developed, sufficiently so to tell us that the Whale is not unintelligent. There are no ear-lobes, only holes, sometimes no bigger than a pin-head. The eyes are small and usually set far back in the sides of the head. The mouth is not connected by a passage with the lungs and windpipe, so that the Whale can take in water and swallow its food without fear of drowning. The jaws are long and reptilian, and provided with a set of powerful teeth.

But at this point it is necessary to discriminate between two distinct types of Cetaceans—between the so-called Baleen Whales and the more numerous Toothed Whales. All Cetaceans have teeth at some stage in their careers, but in Baleen Whales the teeth are absorbed into the gums before birth and in their place there grow a large number of tough, horny plates ('whalebone'). These sprout from the roof of the mouth, and are so closely arranged that they act as a sieve. Despite their colossal size, the Baleen Whales feed only on molluscs and tiny fishes scarcely an inch long, which are swept into the mouth, caught in this complicated strainer, and sucked off by the tongue.

There is another structural distinction between the Baleen and Toothed Whales. In the former the breathing apparatus consists of two nostrils, as in the case of other animals. In the Toothed Whales there is only a single air-hole situated on the top of the head. This aperture is protected by a delicate safety valve, which shuts automatically when the Whale submerges and opens when it wishes to 'blow'. By means of this the monster inhales the oxygen which it needs to keep it alive, surfacing at regular intervals in order first to expel a jet of foul breath and condensed moisture and then to inhale a fresh supply. A Whale's spout is a most impressive sight, like a white fountain fifteen or twenty feet high. In some of the larger species the lungs are so powerful that the huge beast can remain under water

for twelve hours at a time. No seal could go anything like so long without coming up for air ; but, then, except when attacked,¹ Whales are somewhat sluggish in their ways and rarely indulge in any strenuous activity. Zoologists tell us that their blood-vessels are so constituted as to use up oxygen very, very slowly.

No doubt this slothful, dream-like existence, ever lolling in the water, accounts for the truly terrific dimensions to which many of the Whales attain. The Blue Whale is the largest living thing of which there is any record in the whole story of Creation, past or present. A full-grown male will measure well over 100 feet from tip to tail and weigh anything up to 150 tons—more than our heaviest locomotive. By comparison the elephant is a pigmy and even the dinosaur a light-weight ! All the Baleen Whales are of enormous size, and consequently a profitable target for the harpooner's gun. They have been slaughtered to such an extent that it is doubtful whether they can now survive much longer without protection. In 1937 an International Whaling Conference was held at which the representatives of various nations agreed to limit the number of catches.

¹ The deadly cunning and agility of an infuriated Whale is no myth. The following account, at least, is authentic :

'On the fifth day of July, 1840, the English whaling brig " Desmond ", being then 215 miles due west of the port of Valparaiso, Chile, sighted a lone whale which breached his full length above the surface about two miles away. The boats were lowered, but before they were within half a mile of the whale he slewed around head-on to them and advanced to meet them. He struck one boat with his tail, and drove her under stern first and then chewed her up. He then sounded and was lost to sight for fifteen minutes. When he came up it was to lift the other boat thirty feet high on his head, and of course she was completely shattered. Oars and planks were ground fine by his teeth as he wallowed about, and two men were drowned before the whale finally went slowly off to the north.'—(Extract from an article in *The Detroit Free Press* 1891.)

This particular whale—a Sperm—was responsible for the deaths of thirty men before it was finally killed in 1895 by a Swedish whaler.

Not more than 16,000 Blue Whales were to be caught in any year (from which we may infer how many had been killed formerly), and it was estimated that this number would yield some 270,000 tons of oil, an average of 17 tons for each Whale. Since 1939 the whaling industry has been more or less at a standstill, but the world supply of oils and fats is in such a critical position that it seems certain that a heavy toll will soon be levied on the poor Baleen Whales that yet survive. Nowadays there is little chance of meeting with one of them in the flesh : to all intents and purposes they have been exterminated in the Atlantic seas. In any case, they were ocean-going creatures, and were only met with in Britain when they were cast ashore by storms or other misadventures.

Not so the Toothed Whales. They keep closer to our coasts, and are sometimes to be seen fairly close inshore. Commonest of all are the Porpoises, which are miniature Whales. Though no bigger than a man, their bodies are exceedingly compact and their weight is surprising—as you will soon find if you try to roll a dead one along the beach. Like all Whales, they are covered with tough skin and a thick padding of blubber, which serves to keep out the cold and acts as a sort of elastic cushion to protect them from the heavy pressure of deep-sea water. Unlike the Dolphins, the Porpoise has a round, blunt head. It feeds chiefly on herrings and mackerel, pursuing the shoals as they drift southwards in late summer, and frequently penetrating the estuaries and into the freshwater reaches of our larger rivers. The Common, Bottle-nosed, and White-beaked Dolphins, though not so abundant nor so widespread as the Porpoise, are equally familiar to the fishermen of our western and Channel ports. They are considerably larger, too, varying from seven to ten feet in length, and are easily recognized by the curious shapes of their prominent ‘beaks’. They are genial, happy creatures, forever romping and

sporting in the water, through which they ride with the ease and confidence of past-masters. Their life seems to be one endless, aimless procession, spent in majestic idleness. In their great herds they will follow in the wake of ships, lowing softly like the sea-cattle that they are.

Both Porpoises and Dolphins are handsomely marked, purplish-black above, pure white below. The skin is quite naked—the young have a few hairs which they quickly lose—but it shines with a silky gloss that is most beautiful.

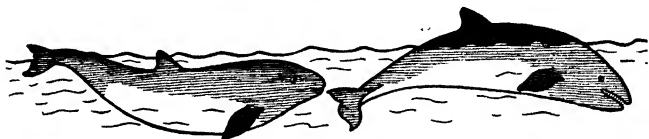


FIG. 7.—Porpoises travelling.

The Common Dolphin with its undulating patterns and streaks looks remarkably like a naval vessel that has been camouflaged with war paint.

Still more striking is the bold black-and-white of the notorious Killer or Grampus. Conspicuous as it looks when seen in a museum, there is no doubt that in a heavy sea this contrast of colours has the effect of rendering the wearer invisible, except at close quarters, when it is impossible to avoid its savage onrush. Intermediate in size between the Dolphins and the larger Toothed Whales, the Killer is probably the most ruthless hunter of the seas. Not only does it prey on the smaller Cetaceans (swallowing Porpoises whole), but it attacks and destroys the mighty Blue and Sperm Whales themselves, tearing out their vitals and worrying them to death. It travels in wolfish packs, spreading terror and devastation wherever it goes. As with most Whales, the female Killers are considerably smaller than the males.

In the spring of 1890 a party of these revolting brutes entered the Thames estuary and swam up-river far beyond Westminster Bridge. People lined the banks ; newspapers reported their daily progress ; and great was the interest, not to say consternation ; but they departed peacefully and found their way back to the sea without doing any harm or suffering from their escapade.

Others are not so lucky. Every few years we hear of Whales of one sort or another being cast up on our beaches, there to perish in the most miserable manner. Dolphins, Killers, False Killers, Pilot Whales, and others are reported ' shipwrecked ' from time to time, often in hundreds. A hundred years ago no fewer than 2080 Pilot Whales were driven ashore in the Faroe Islands. In the same year 1540 were killed in two hours in the Shetlands. What is the reason for such disasters ? Mainly this : that all Whales are sociable creatures and follow their leaders with blind faith and devotion. Should the leader swim so close inshore as to get involved in tidal currents, the others follow ; they plunge on blindly through the shallows and became hopelessly stranded. Only the buoyancy of the surrounding water supports their unwieldy hulks : once out of it they are quickly suffocated by their own weight.

As with land mammals, the young Whale is born alive and is reared on the open sea. In *Moby Dick* you may read a touching description of one of these ocean nurseries : the huge shapes of the mothers floating on their sides, the sucklings gazing up at the sailors almost like human infants at the breast, and their enormous sires eyeing the ship with innocent, placid eyes, suspecting nothing.

And indeed there is something pathetic and appealing in the very size of Whales. Of all animals they are the most helpless and defenceless. They differ as widely in their characters as Rabbits do from Foxes ; but whether it be the merry Dolphin, the simple-minded Pilot, or the ferocious

Killer, one cannot help feeling that they deserve a kindlier fate than that which they have suffered at the hands of those pigmies—men.

LIST OF THE CHIEF WHALES, DOLPHINS,
PORPOISES SEEN OFF BRITISH COASTS

GROUP.	SPECIES.	SIZE.	REMARKS.
WHALEBONE WHALES.	Blue Whale .	100 ft.	Extinct in N. Atlantic ; largest known animal ; spout said to rise 30 ft.
	Rorqual . .	30 ft.	Occasional off Scottish coasts.
	Fin Whale .	70 ft.	Practically exterminated.
	Humpback .	50 ft.	
TOOTHED WHALES.	Pilot Whale .	15-30 ft.	Fairly frequent off North of Scotland — the 'Black Fish.'
	Killer or Gram-pus	12-20 ft.	Coastal ; hunts in packs.
	Sperm Whale .	40-70 ft.	Almost extinct off British coasts.
	Bottle-nosed Whale	20 ft.	Like a giant Dolphin—rarer now than formerly.
DOLPHINS AND PORPOISES.	Common Dolphin	8 ft.	Commonest off our southern shores.
	Bottle-nosed Dolphin	10 ft.	
	Porpoise . .	6 ft.	Common on all British coasts—often seen close inshore.

CHAPTER X

THE INSECT-EATERS (HEDGEHOG, MOLE, SHREWS)

FROM the sublime we descend abruptly to the ridiculous : from the stupendous Whales to a group which includes the smallest four-footed animals in the world. The next Order of mammals, the insect-eaters, is represented by five species in the British Isles—the Hedgehog, Mole, Common, Pigmy, and Water Shrews. Three of these—the Mole, Common and Water Shrews—are not found in Ireland.

The insect-eaters are all small and somewhat frail of build, and because of their many disadvantages have been compelled to take up a more or less nocturnal existence in order to avoid their enemies. Though they are not averse to sampling other kinds of food, given the chance, insects and grubs provide their staple diet. Of all animals they are most earth-bound. Since Nature has not provided them with weapons of attack they have each developed their own methods of self-preservation. Inoffensive as they are, it must be admitted that from an evolutionary point of view they appear to be at a standstill. Unlike the Rodents, from which they differ in having small incisors, they have failed to make any marked forward progress, and must be considered as being still in a very primitive stage on the Ladder of Life. For example, there were Moles in this country long before man appeared, and as far as can be judged from fossil remains these early specimens were in no way different from the present-day British Mole. Moreover the brains of the insect-eaters are of a low type, poorly developed at best.

You must not think from this that any disparagement of

these humble creatures is intended : far from it. One quality at least they possess, and that is charm. After all, we do not judge an animal (or a fellow human being for that matter) solely on the grounds of intelligence. The Rat has brains and is detestable. The Hedgehog is a stupid blunderer, and yet somehow likeable.

There is a family of Hedgehogs in my garden. Every winter, about the middle of November, they tuck themselves in under the dead leaves—just where, I can never make out, though I have watched most carefully to locate their hide-outs—and are not to be seen for the next four or five months. When May comes round a saucer of bread and milk is the best means of discovering whether they are out and about again. Sometimes they may be heard before then, snuffling and fidgeting in their beds as though their sleep was fitful—and what snorers they are ! The first warm evening is sure to tempt them forth. Soon after dusk they venture out, shuffling across the lawn on their short, slow legs. Presently the silence is broken by a series of low squeaks—half-grunts, half-bleats of delight—as the pair fall to their ready-found meal. In a few minutes they have scoffed it all ; and away they go, nibbling at oddments as they trudge along through the grass.

This particular pair have been faithful to one another for the past three years. What becomes of their offspring it is hard to say : probably they drive them off to seek their own fortunes elsewhere. One year they had a double litter, five infants in June and six more in August ; but when spring came round again the original pair remained in undisputed possession of the garden. The father, an old ' boar ', is a grand fellow, not quite ten inches long and fat as butter, clad in an impenetrable armour of spines. He and I have grown to be quite familiar with each other. Whenever he is approached, he knows better than try to escape by flight. Should it be a stranger, however, down goes his head at

the first footfall ; he shrinks, and the moment he is touched he curls himself up in a flash. Should he feel that the danger has passed he may relax a little, showing his shrewd snout and peeping out at the intruder with his rheumy eyes, but often it is a long time before he dares to do so. Usually it is wiser to refrain from handling him, for Hedgehogs, more so than most animals, are horribly infested with fleas.

This mechanical device of the Hedgehog is an instance of purely defensive protection. Being a slow-moving animal, incapable of launching any serious attack, it has, after countless generations, developed this prickly covering in order that it may survive. Had it not done so, it is fair to suppose that the race would have been wiped out long ago. Yet these spines are nothing more or less than bristles—hairs which have become so hard and spiky that they can now fend off the most determined antagonist. At birth they show as soft, cream-coloured quills, but they quickly harden, and at three weeks old the young are safe from attack. The spines are firmly embedded in a tough, thick, leathery skin and are controlled by a special set of muscles, so that the Hedgehog can erect them at will. They are so arranged that when the body is doubled up they point in every direction, an impregnable array.

Thus equipped, the Hedgehog finds his way about in safety, goes about his business at his own leisurely pace, as if conscious that he is immune from the dangers of the world about him. Occasionally a rogue Badger may succeed in tearing him apart, regardless of scratches, or the wily Fox push him over into water, where he is forced to uncurl and face the consequences ; but more frequently he meets his end on the king's highway, run over by some passing motorist. Slowcoach that he is, his instincts betray him at the critical moment. No sooner is he caught in the glare of the headlights than he tries his one and only trick, clenching-to like a fist—often with fatal results.

The Mole has specialized in an entirely different way. To escape his enemies he has taken to living underground. In addition, he has a somewhat offensive smell which deters many of his pursuers, so much so that even the hungry Fox and Stoat will rarely touch his flesh.

Examine a Mole and you cannot but marvel at the ways in which he is fitted for his subterranean life. From head to tail his body is almost cylindrical, a useful shape for a burrower. He appears to have no neck : why should he when his sole purpose is to be rigid, a boring tool ? All four legs are short, half-enclosed inside the fur so as not to impede the Mole's progress in a narrow passage : he hitches forward on his stomach. His forelimbs branch out sideways, the ' hands ' facing backwards. He has broad, fleshy palms, tipped with strong nail-claws, and to assist him further in his work he is provided with a sort of additional finger or false thumb. The arm-bones, too, are unusually thick and powerful for so small a creature.

Many people, and most ladies, admire the velvety texture of moleskin, but do they ever examine it closely ? The fine, waterproof hairs are short and thick, but, unlike the fur of any other animal, they stand up vertically from the skin and do not slope backwards. You may stroke this fur *either* way. The Mole, you see, requires to move backwards or forwards in his tunnel without hindrance and without the inconvenience of having loose soil work its way inside his coat whenever it is ruffled. His tail is short and stumpy for much the same reason : it must not get in the way.

A glance at his head is sufficient to remind you that the Mole does not rank high in order of intelligence. The snout is thin and pointed. With it he feels his way about in the darkness, wrinkling it delicately from side to side as he prods on through the earth, sniffing out worms. Touch and smell are concentrated in the sensitive nerves at the tip of this long proboscis. What use are eyes underground ?

All the same, the Mole has not entirely lost the use of his eyes, as is often supposed. True, they are reduced to the merest pin-points, and are so completely surrounded by dense fur that his field of vision must be very limited. Short-sighted he certainly is, but not blind.

The Mole feeds on earthworms, grubs, pupae, and any eatable trifles that he chances to root out on the way. His life is a never-ending, strenuous rota of digging and feeding, feeding and digging, and so *ad infinitum*. His method of eating a worm is invariable : he bites it across the head and chews it bit by bit, working towards the tail, thus expelling the earth contained in the tube-shaped stomach. Because he must have a constant supply and because he is by nature thirsty, the Mole prefers to make his runs in damp corners of the fields. In many ways he is the farmer's friend ; but, unluckily for himself, the good he does in destroying injurious insects is outweighed by the damage he causes to root crops and newly-sown seeds.

He has a habit of turning up just where he is least expected and least wanted. Believe it or not, one appeared recently in the middle of my neighbours' lawn, though to get there he had had to tunnel under a row of houses and a concreted road. Not long ago one caused a great deal of consternation at one of our North-country race-meetings. Here the course ran far into the open country some distance from the grand stands and popular enclosures. It was the morning of the great race ; the final arrangements had all been completed, and the groundsmen had done their work so well that the track was as trim as a tennis-court. Who could have foreseen that the ' old gentleman in velvet ', Mr. Mole, would upset all these careful preparations and be the cause of sending home hundreds of disappointed racegoers ? Shortly before three o'clock he went to work, throwing up one—two—three hummocks of soil right in the path of the horses. The ' favourite ' was well in the

lead, going strong, when he was seen to stumble and throw his rider headlong. Fortunately the accident was not serious, but thousands of pounds were lost as a result of that mischance.

Unlike Hedgehogs, Moles lead a solitary existence during the greater part of the year ; nor do they hibernate. They spend the winter and spring in a deep dug-out of their own making. Seen from the outside, this 'fortress', as it is called, looks like a very large molehill, the only apparent difference being that instead of being a few inches it is

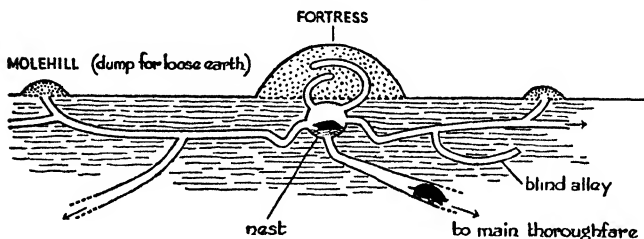


FIG. 8.—The Ramifications of a Mole's home are as intricate as they are haphazard.

usually two or three feet high. This outer dome is the roof of the Mole's headquarters. It is the centre of a labyrinth of underground passages as complicated as any in a London Tube station. There is an innermost chamber in which the nest is made and the young ones are born, usually in late spring. There are main thoroughfares and side galleries, bolt-holes in case of emergency, and numerous blind alleys. Some of these cul-de-sacs are merely tunnels in which the Mole has lost interest, which he has begun and afterwards left unfinished. For the sake of drainage the passages leading out of the fortress dip down, but apart from this the lay-out of this subterranean residence appears to be rambling and quite haphazard. Scarcely two are alike.

It might be imagined that Moles being so hermit-like in their ways would rarely, if ever, come across one another in their wanderings. We know that they are very home-keeping and exceedingly jealous in preserving their private territories ; but often their passages intersect and some of the thoroughfares are apparently common property. When two Moles meet head-on a ' traffic-jam ' ensues : then the fur flies ! Rather than allow the trespasser to pass, the rightful owner challenges the other to a stand-up duel. During the breeding season the males fight to the death.

This unsociable trait is still more marked in the Shrews : indeed the very word ' shrewish ' has come to mean cross-grained and ill-tempered. They seem to be happiest when left to themselves. Perpetually busy, always full of high spirits, they spend their lives in rushing hither and thither in feverish haste.

The Hedgehog foils its enemies by its coat of mail, the Mole by retiring out of view. Odd as it seems, the Shrews have survived simply because they are so insignificant. They are so tiny that as often as not they are overlooked ; and when they *are* spotted they are so spry and elusive that they escape injury. A rustle in the leaf-mould, the faintest twitter in the hedge bottom—that is about as much as we hear of them at most times. The Common Shrew must be one of the most prolific inhabitants of the countryside, yet few people have actually seen one. A scurry in the grass, a glimpse of umber brown as it darts between the blades, and it is gone. If you wish to study a Shrew more closely the only thing to do is to sit tight and wait for it to show itself in an open space. If you are very, very still it will run along your hand, and—if you are quick enough—you *may* be lucky enough to catch it.

What a featherweight he is, light as a cigarette, with a wry little face and a slender beak of a nose (much longer than the Mole's) which he keeps wriggling about in all

directions, testing the air. Apart from his size, it is impossible to mistake him for a Mouse. He is longer in the body and far more puny. A quivering little mite, he is oddly beautiful. His teeth are a bright orange colour and his legs are flesh pink. His underparts are off-white, his chestnut fur lustrous as silk—an elfin aristocrat! There is a touch of tawny on his flanks. But it is that whiskered nose that catches the eye most—and, speaking of noses, you will not fail to notice the musky stench which he leaves behind when you have released him. It is his sole means of discouraging his assailants. That is why cats will kill, but never eat, a Shrew.

All Shrews are lively little creatures, but for sheer exuberance the Water Shrew is surely without equal in the whole animal kingdom. The energy it displays is amazing. Darting from its hole in the bankside, it fairly hurls itself at the stream, plops in and swims swiftly underwater, weaving in and out through the tangled fronds of milfoil, snapping up aquatic beetles or other trifles as it goes. Its coat looks silvery, shrouded in air-bubbles; and up the tiny athlete shoots, popping out like a cork, to scamper among the rushes. Never still for an instant, never pausing to think, its life is one of never-ending bustle and excitement. In season and out, day or night, it is the same restless, tireless, feverish round of activity. The Water Shrew runs till it drops. As its name implies, it differs from the other members of the family in its haunts and habits. By preference it makes its home by sluggish riversides or stagnant backwaters, but a ditch will often serve its purpose equally well, and at times it is to be found at considerable distances from the nearest water. From its near relatives, the two land Shrews, it may always be distinguished by its rather blunter nose and larger size. Fully grown, it measures a good five inches. Its fur is much darker, umber-black.

The exquisite Pigmy Shrew, the smallest of all our

British mammals, is barely $3\frac{1}{2}$ inches long. Subtract $1\frac{1}{2}$ inches for his tail plus $\frac{1}{2}$ inch for his nose, and you will see that his body is packed into little more than 1 inch. He can be distinguished from a young Common Shrew at any time by his comparatively longer tail and his greyer fur.

Both Common and Pigmy Shrews breed several times throughout the spring, summer, and autumn. The Water Shrew, on the other hand, is like the Hedgehog, that is, it rarely has more than two litters in the year.

All Shrews are short-lived, tearing about at such a rate that they are worn out in little more than a twelvemonth. When it comes, the end is mercifully abrupt: they simply die in their tracks. In September and October roadsides and woodland paths are often littered with scores of tiny, limp bodies—a windfall for prowling crows and other eaters of carrion. After a heavy thunderstorm the death roll is often immense, as though the electricity in the atmosphere was too overpowering for such delicate constitutions. They are so toy-like in their structure, such bundles of intense nervous excitement—rather like those miniature wrist-watches that ladies sometimes wear—that we can well imagine them to be incapable of standing up to violent shocks. The wonder is that they should survive at all.

CHAPTER XI

THE NIGHT-FLIERS (BATS)

' A twitch, a twitter, an elastic shudder in flight
And serrated wings against the sky,
Like a glove, a black glove thrown up at the light
And falling back. . . .
Wings like bits of umbrella.
Bats !
Creatures that hang themselves up like an old rag to sleep,
And disgustingly upside down.
Hanging upside down like rows of disgusting old rags
And grinning in their sleep.
Bats !'

THAT is how one of our modern writers, D. H. Lawrence, felt whenever he saw these creatures of the twilight flittering and looping above him ; and most people would agree with the poet in thinking of them as being rather loathsome and repulsive. From the earliest times Bats have been regarded with a certain amount of superstition, as evil, even unclean beings, to be avoided like the plague. You will still hear people tell all kinds of silly and lurid stories about them—people who in their ignorance think that they are better destroyed.

Nothing could be further from the truth. Bats are as interesting—and certainly as useful—as any other group of animals on the British list. Admittedly, their appearance is distinctly unusual, not to say grotesque : their faces are caricatures, and their bodies misshapen ; but we should not allow their looks to prejudice us. Certainly we should not make the mistake of thinking them unnatural merely because they are not beautiful to our ways of thinking. No wild creatures have been so much misunderstood as have the Bats. Instead of studying them, country folk have been too content to believe the various rumours about them,

and the result is that our knowledge of their habits and private lives is still very scanty. There are still many mysteries concerning Bats which need to be solved. Maybe *you* can help to solve them.

There are no fewer than twelve kinds of Bat to be found in the British Isles. All of them feed on insects. They are all rather small, varying from the Noctule, with a span of fifteen inches, to that midget, the Pipistrelle, with a span of eight inches. Since they come out only at dusk it is almost impossible to identify any of them with certainty: their flight is too flickering and erratic for us to see them clearly. If you wish to be sure which of them are to be found in your district the thing to do is to find out where they hibernate—church belfries, hollow trees, or caves. There you may handle them at close quarters while they sleep and discover for yourselves the details that distinguish one from another. It is the only way. At the end of this chapter there is a rough list that will give you some idea of where the various species are most likely to be found. From it you will see that Bats are commonest in the south and west, where insect-life is most abounding. The little Pipistrelle, of course, is to be found everywhere. For most people it is *the* Bat; but the great Noctule is almost as well known. No doubt you have seen it late on summer evenings, careering high among the Swifts and House Martins, dipping abruptly as it plunges to take a cockchafer. The Long-eared Bat, too, is not difficult to recognize. The Water Bat haunts slow-running rivers and lakesides; but that does not mean that *every* bat which you see flying over rivers and lakes will necessarily belong to this species. If you wish to satisfy yourselves about the others you must make it your business to examine them in the hand.

Some years ago a pair of small Bats kept swooping in and out of the gables of my house. I used to watch them as they hunted for midges over the garden walk, up and down

and round and round, now poising above the bushes, now swivelling back to rush in under the eaves. 'Pipistrelles, naturally,' I told myself, and thought no more about it. Then one winter we had some repairs done to the roof. When the slates were lifted the workman laid bare a group of shrivelled forms hung by their hind-legs to the rafters. He asked me to come up and take a look, which I did. There they were, the little elves that had so often amused me by their antics : not Pipistrelles, however, but Whiskered Bats—the first I had ever seen. Which shows how painstaking one must be if one wishes to be sure in one's identification.

'As blind as a Bat' is a common saying, but it is far from being accurate. True enough, Bats do not rely on sharpness of vision in catching their prey. Unlike most nocturnal animals, their eyes are small and weak. They work more by some delicate sense of touch and hearing rather than of sight. This has been proved by experiment. If a Bat is blindfolded and then released in a dark room it continues to fly round, finding its way without any apparent difficulty. The room may be full of people, its shelves crowded with ornaments and all sorts of obstructions—furniture, wires, sticks brandished in the air to strike it. The Bat avoids them all : the black-out has no terrors for this night-farer !

How is it able to fly so neatly without the use of its eyes ? What is it that gives it this uncanny power of anticipation ? If you look at the sketch on page 90 you will notice that the bat's ear is a very curious instrument. Not only is it large in proportion to the rest of its body ; its shape and structure are peculiar in themselves. The flap, or tragus, which covers the entrance (you may feel a small one on your own ear) is greatly enlarged, so prominent that you cannot fail to notice it. Both it and the lobes are highly sensitive, and it is thought that by means of these the Bat



PLATE VIII

Above. THE OTTER'S PROFILE.
An example of perfect streamlining.

Below. OTTER TAKING A NAP.
Note the flat muzzle and whiskers.



ATLANTIC GREY SEALS AT
HOME.



ATLANTIC GREY SEAL BULL.

can, as it were, both *hear* and *feel* when it is suddenly confronted with some obstacle.

The Greater and Lesser Horseshoe Bats possess a still more cunning gadget. They are provided with an enormous 'nose-leaf'. This, like the tragus of the Earlet Bats, is a patch of tender, bare skin which surrounds the nostrils and serves pretty much the same purpose. Many naturalists have claimed that Bats must possess a sixth sense, but the

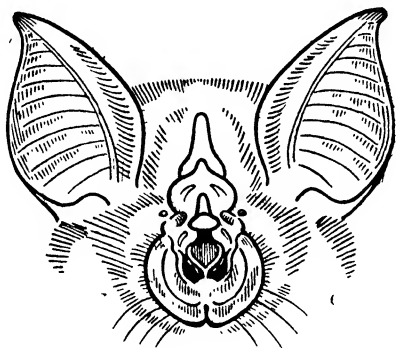


FIG. 9.—Greater Horse-shoe Bat, showing the curious 'nose-leaf'.

real explanation of their amazing precision is probably to be found in this highly specialized combination of hearing, smell, and touch. You know how a blind man learns to read meaning with his finger tips. When one sense fails another comes to the rescue. When German night-bombers first raided this country our defences were often baffled because they could not *see* their objectives. Searchlights probed the skies, but as often as not the gunners were reduced to hit-or-miss methods, like blind men groping in the dark; and then, as everyone knows, our scientists discovered the secrets of radio-location. We no longer

needed to see in order to know where our enemies were. So it is with the Bats, only in their case the invention is not new : it has been developed and perfected during the course of many thousands of years.

The senses of Bats must be far more acute and more intense than those of human beings. We live at a regular, jog-trot pace. *They* dash about for a few hours like winged furies, and then relapse into a state of complete coma. Day

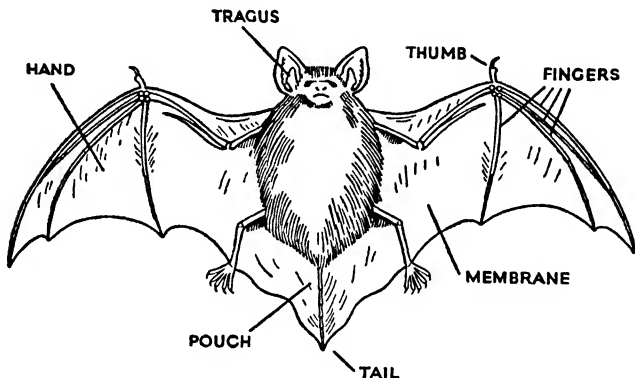


FIG. 10.—Structure of the Bat.

by day we take our meals at regular intervals. *They* cram themselves with food at night and sleep throughout the daytime—and fast for six months in the year. You have only to listen to their voices to know something of the difference—shrill, high-pitched notes ; indeed many of them are so high-pitched that they cannot be heard at all by the human ear.

But the most wonderful piece of apparatus of the Bat is that which enables it to fly. For want of a better word we must call it a ' wing ', but in reality it is nothing else but an overgrown hand. The finger bones have grown to such

an extent that they are longer than the body ; only the thumb-claw is left free. Palms and fingers alike are connected by a web of frail and wrinkled skin. Despite its leathery appearance, this membrane is a network of blood-vessels and nerves, so delicate that it responds to every change and slightest whim of the air-currents. It joins up not only with the hind-legs but with the tail itself, forming a pointed pouch which the owner can retract at will. Maybe you have seen a Bat double up in its flight as though biting its underparts ; if so, the reason was that it had just caught some large insect—a Stag-beetle, perhaps—and was holding it in this pouch to devour it in mid-air. It is into this skinny pocket that the young Bat is first dropped when it is born, though afterwards the mother will hoist it to her breast and carry it at her side. And the pouch has other uses : it serves as an extra limb when the Bat is climbing.

The Bat's wings, then, are really a sort of parachute that envelops the entire body. With them it can ascend to great heights, and for short stretches attain speeds of which no other mammal is capable. The flight may not be so powerful nor so sustained as that of birds, but it is superior to theirs in nimbleness and control. Watch the Bat pull up dead ; see it twist and dodge and dart backwards on its tracks. Not even the Swallow has so many tricks. Such aerobatics !—the human eye is too dull and slow to take in half the subtle intricacies, the unexpected twists and flickering turns of the Bat's amazing flight.

If you catch a Bat—and often they dart in at bedroom windows—you may feed it on house-flies ; but you will be kept more than busy, for you will soon find that it has an enormous appetite. You will need to keep it well supplied with drinking water, too, for all Bats are thirsty creatures. You will also find that it is very awkward when it comes to walking. On a flat surface its overgrown fore-legs

are a great encumbrance ; it shuffles along in a most painful manner until it reaches some climbable object, a curtain or a chair-back. To this it clings, using its hooked thumbs to lift itself. Then, when it has gained sufficient height, it will launch itself into the air : or, if it feels sleepy, will attach itself by its feet to some bracket and hang upside down in perfect comfort. Put your finger to its nose and it will bare its mouth in an expression of fear, and you will see that its teeth are sharp as the finest needles. They are too small to hurt anything but a fly.

Because of their peculiar needs it is almost impossible to keep Bats in captivity, but those who have succeeded in doing so for a time have found them excellent pets. They are very clean in their ways, licking themselves and combing their fur with the utmost care. Their private lives are still very much a closed book to us, but they are known to be the most affectionate of parents and very sociable. A solitary Bat is practically unknown ; they like best to be with others of their own kind whether it be breeding, feeding, or during the long months of their winter sleep. Of all animals they are the most specialized in their way of life and consequently cannot be said to be very intelligent, but there is no denying their interest and charm. Yes, charm. They are the gnomes, the eery sprites of the wild ; and what would a summer evening be without their puckish frolics ? Long life to the dusky Bat !

LIST OF BRITISH BATS

FAMILY.	SPECIES.	WHERE FOUND.	HOW TO IDENTIFY.
EARLET BATS.	Noctule or Gt. Bat . . .	Common, England and Wales.	Large size, 15" span ; over woods ; ears short ; brown.
	Leisler's Bat .	Ireland—locally in W. Riding, Cheshire, Midlands and Gloucestershire.	13" span ; woodlands ; very rare.
	Serotine . .	S. England, chiefly Kent.	14" span ; low flier ; ears about $\frac{3}{4}$ " long ; glades.
	Pipistrelle .	Common throughout British Isles.	8" span ; often seen in winter.
	Daubenton's, or the Water Bat . . .	Lakes and streams.	10" span ; belly white ; ears longer than Pipistrelle's.
	Natterer's Bat	W. England, Wales, Ireland.	11" span ; ears long ; underparts white ; hibernates churches and caves.
	Bechstein's Bat	Our rarest Bat ; one or two records only.	15" span ; low flier ; long broad ears.
	Whiskered Bat	Midlands and South—rarer in North.	9" span ; solitary flier ; longer ears and whiter breast than Pipistrelle.
	Long-eared Bat	Common in all parts—rarer Scotland.	10" span ; ears enormous.
LEAF-NOSED BATS.	Barbastelle .	Southern Counties.	10" span ; almost black ; solitary ; ears joined at base.
	Greater Horse-shoe Bat .	S. Wales, S.W. England.	13" span ; elaborate growth on nose ; inhabits caves.
	Lesser Horse-shoe Bat .	Southern Counties, Midlands, Wales.	8½" span ; yellowish fur ; near caves.

CHAPTER XII

LESSER HUNTERS (THE WEASEL FAMILY)

THERE is a stir of excitement at the wood-edge. Black-birds cackle hysterically ; the Thrush whines in fear ; and there is a confused simmer of notes from the bushes, filled with the restless figures of smaller birds, Tits, Warblers, and Goldcrests. All are fidgety, scolding at some creature on the ground below. But what ?

We are not kept long in doubt. As if to answer the question, out prances a little furry beast no bigger than a pencil : a Weasel. Immediately he begins a series of madcap antics—runs round in circles as if trying to catch up with his tail ; halts and rears on his haunches, grinning and grimacing up at his audience—then off again in the opposite direction, worming his way through the grasses. He capers ; he pirouettes ; he pulls up dead, arching his back and wrinkling his long, white whiskers in a fiendish leer. In all his movements there is a kind of baleful attraction that at once repels and yet fascinates : we cannot draw our eyes away for fear of missing his next trick, but all the time we feel at the back of our minds the sinister nature of his intent. Is he just playing—or has he taken leave of his senses ? The birds cannot be sure : they gather round, some heckling him, others looking on in silence. Fools ! Surely they recognize their danger, see through the snare that is all the while being woven about them ? Not they ! Closer they crowd in a ring, watching the Weasel's manoeuvres, charmed by his magic circles.

Suddenly the hunter shows himself in his true colours, darts sidelong and pins one of the unsuspecting Tits in his

forepaws. A squeak of pain, a general twitter of alarm, and the spell is snapped : the birds scatter and are gone in an instant, leaving the victim to its fate. For a moment the Weasel stoops to dispatch his prey, then seizes it with his fangs and comes trotting towards us with the limp body in his jaws. He advances almost to our feet, spots us at the last moment and gallops off into the undergrowth. A moment later he reappears, ogling at us from behind a tree-stump, wondering whether he dare retrieve his prize. See ! He squirms like an eel, wriggles out of sight, bobs up again at the base of the next tree, and then—giving it up as a bad job—makes a bolt for it into the depths of the thicket. When we pick it up, we see that the Tit is already dead, bitten across the nape of the neck.

Such an incident is typical. The Weasel is the smallest of all carnivorous beasts, and for his size is probably the most aggressive fighter in the world. He will tackle and destroy animals far larger than himself. He has been known to attack a full-grown Hare, fastening to its throat and hanging on while the wretch bucked and galloped until at last it fell exhausted, bitten through the vital artery. Even the boldest Fox leaves the Weasel severely alone, knowing what a dangerous character he is.

Here in a clearing is a gibbet, hung from end to end with the corpses of miscreants, furred and feathered, which have fallen foul of the gamekeeper's gun : Crows, Hawks, Magpies, Rats ; and here, nailed in a separate row, are six dead Weasels, the last one a recent addition by the look of things. Now that we have the chance, let us examine it more closely. It is not much to look at, really, a mere slip of a thing—a midget. Its body, clad in a reddish gingery coat of close, short-cropped fur, is excessively long, so thin and supple as to appear snake-like. The head is small, the skull flattened, the muzzle short and shrewd, concealing the curved fangs or canine teeth which alone

betray the Weasel for what it is—a seeker of blood. The legs are quite short—rather odd, considering the Weasel's turn of speed. Chin, throat, and stomach are spotless white, the tail of medium length.

It is this last feature, the tail, which best distinguishes the Weasel from its near relative, the equally bloodthirsty Stoat. All told, the Weasel is no more than nine inches long, whereas the Stoat may measure over fifteen; but facts of this sort are often of little use in the field. Besides, in both species the females are considerably smaller than the males, so that if we were to rely on size alone, we might easily confuse a large male Weasel with a small female Stoat. Then again, there are the young ones to be taken into consideration. To be quite sure in your identification, look at the *tail*. The Stoat's is long and bushy, tipped with a conspicuous tuft of black hair. The Weasel's is shorter and plain brown.

Both Weasels and Stoats are born slayers and hunt in much the same way. On the whole the Weasel, because of its smaller size, is the less deadly of the two, usually confining itself to such lesser game as Mice, Voles, young Rabbits, and small birds. The Stoat is more ambitious and dines regularly off Rabbits, Partridges, and Pheasants: hence the merciless war waged upon it by gamekeepers throughout the land. Both are classed as 'vermin', and every effort by gun, trap, and poison has been made to exterminate them, despite which they continue to flourish and may be met with almost anywhere, even close to the outskirts of our biggest cities. To see a Stoat track down a Rabbit is an experience never to be forgotten, if only because it is so dreadfully sinister. Stealthily he creeps up behind his quarry, picking it out from the others as they bob along on the greensward. Somehow the victim seems to know itself to be doomed, for though there is ample time for the Rabbit to double back into the warren, its

limbs are numb with terror. Both Stoat and Weasel have scent-glands which emit a powerful odour when they are hot on the trail ; and it may be that the first whiff of its deadly enemy is enough to reduce the Rabbit to impotence. Mesmerized, it lies on its side, squealing, waiting for the death-blow. Only when it feels the sting of those fatal fangs does it leap into action. Too late : the spinal cord is already severed. The end is slow, painful to watch. The Rabbit leaps high in the air, bouncing like a ball, writhing in its last agonies, and then lies still, allowing its remorseless slayer to complete his devilish work.

Harrowing as such a sight undoubtedly is, it is still more pathetic to see a party of Weasels clear out a Vole run. Then the reason for their having such short legs and slim, elongated bodies becomes apparent : they can squeeze through the narrowest crack, follow the fugitives to their innermost recesses underground. There is method in their hunting, too. One will wait outside, keeping an eye on the exits, while the other drives the Voles to the surface. One by one the little burrowers are forced out—snapped up the moment they make a dash for it. In much the same way I have seen a team of Weasels clear out a colony of Sand Martins in ten minutes. Sometimes they hunt in packs, and at such times are said to be recklessly bold, attacking large animals and even (so the stories go) human beings. They will kill for the sheer pleasure of killing, often leaving what they cannot eat ; and many a farmer knows to his cost what wanton destruction they can cause in an unguarded poultry-run.

But Stoats and Weasels are not always in this insane, berserker mood. In late summer and autumn they are often to be seen in sportive frolics, parents and young running races and gambolling together. The pairs are very loyal and affectionate one to another, producing a single litter of 5-7 cubs in early spring. In winter they frequently

make their homes in haystacks, tunnelling through the straw to prey on Mice and Rats.

The fulsome, musky stench which makes both Weasel and Stoat so unmistakable is still more pronounced in the rare Polecat. So disgusting is the smell of this animal's fur that in the old days it was better known as the 'Foul-mart', from which it derives its alternative name of Foumart. Personally I prefer the latter, though it is now used but rarely, for, as a name, 'Polecat' is apt to be misleading.

This much-persecuted beast is no cat but a typical member of the Weasel family, a larger and yet more deadly edition of the Stoat. In shape and size it closely resembles the Ferret, which, indeed, is nothing more or less than a semi-domesticated type of Polecat. Most Ferrets are whitish and pink-eyed—albinos—but now and then you will come across one that has dark brown fur and cream-coloured markings on the face and ears. Next time you see one of these 'throw-backs' examine it carefully, for that is what the wild Polecat looks like; and if you get a chance to go ferreting, by all means take it. To see a Ferret worm its way through a warren is to form a pretty good idea of how the Polecat goes about its work, of the utter ruthlessness of its methods. And if you handle one (which you must do most carefully, for even the best-trained Ferret is treacherous, snappish) you will doubtless get a whiff of its abhorrent scent, particularly if it is in any way excited or annoyed.

As things are, you are scarcely likely to see a Polecat in its natural haunts, since these are now confined to one or two swamps in Wales and some of the remoter districts of Scotland. Because of its greater size and more slothful gait, it has suffered from persecution far more than the nimbler Stoat and Weasel, and unless it is rigorously protected must soon be added to the list of extinct British animals. It would be a pity if that were to happen, for though it is undeniably destructive, a veritable demon,

the Polecat is a native of this country and one of the last representatives of our predatory species. Like the other Weasels it is a nomad, but unlike them it has been driven to assume nocturnal habits. It shows a liking for marshy districts, and is said to be very partial to fish. It is even believed to stock its larder with paralysed frogs, biting them through the brain in such a way that they are incapable of moving though not actually dead—the idea being to keep them fresh, to be devoured at some later date. Personally I cannot vouch for the truth of this : it may be just another old-wife's tale. But a Cardiganshire farmer friend of mine swears that it does, in fact, make stores of this kind ; and I can well believe it, for the Polecat is nothing if not a butcher. At times it is seized with bouts of uncontrollable frenzy during which it has only one desire—to kill, kill, kill.

Largest, most magnificent, and, unluckily for us, the rarest of the Weasel family is that handsome beast the Pine Marten, which still lingers upon a few mountainsides in all four countries of the British Isles. Once it was well distributed in most woodland districts, but to-day its numbers are reduced to such a dangerously low level that it seems improbable that it can survive much longer. It *might*, given the chance ; but every man's hand is set against it.

No words of mine can express the beauty or elegance of a Pine Marten. Almost three feet in all, it has a long brush of a tail. Its muzzle is sharp, more 'foxy' than that of the Stoat ; and its rich chestnut coat, with the pale yellow throat and the bushy tail, not to mention its size, may lead to its being mistaken at times for Reynard himself. I say this, remembering the first Marten I ever had the good fortune to see. I was picking my way down the screes of Hart Crag in Cumberland when I caught a glimpse of rust-red twitching among the rocks far below on the far side of the cove. The angle of descent was rather abrupt, the

stones loose underfoot—no place for sprinting ; but I put on what speed I could, quite sure that I was on the tracks of a fell fox. Suddenly I halted. No fox, this ; its movements were too lissom and sprightly ; it bounded out like a squirrel, threading its way in and out of crannies in the granite as nimbly as a mouse in a wood-pile. It had still not seen me ; but when it finally got wind of me it made a dash up the vertical rock-face to an inaccessible ledge, where it crouched, hissing down at me, much as a Stoat will do when taken off its guard. The situation was exhilarating—the valley floor misty below, the grey buttress of the precipice above, enclosed on three sides by that vast amphitheatre of rocks, and there, perched on its shelf, the Marten defying me with its boldest look. Another moment and it had whisked away, scuttled up the rock-face and over the sky-line in an instant. Seen like that, it seemed the very spirit of the mountains.

As its name implies, the Pine Marten is more arboreal than the other Weasels : it is only because it has been expelled from its natural haunts that it has taken to living in the treeless wilderness. Like the Ancient Britons before the invading hordes of Angles and Saxons, it retired to the mountain fastnesses, there to seek refuge. In Cumberland it rarely leaves the bleak summits unless forced down by hard weather or during the breeding season ; but in many of the coniferous forests of the Highlands it may still be seen, leaping and running among the branches of the dark firs, thoroughly at home in the tree-tops. There it will sit in a crotch, waiting to pounce on any unwary bird the moment it alights. On the ground it stalks its prey as the Stoat does—stealing upon it unseen and then charging at top speed. There is no escaping that final, headlong dash : tail erect, it streaks towards its objective in irresistible bounds.

Like the Polecat, the Pine Marten often has two litters.

in the year, the first early in spring, the other in late summer. Some Martens, like the Weasel, Stoat, and Polecat, make their nests in holes among the rocks, but a more usual site is in the disused nest of a raven or crow, or, better still, a buzzard's eyrie. The cubs, blind and helpless for more than three weeks, quickly take to climbing and scrambling with wonderful agility. Their paws are thickly lined with fur, and equipped with sharp claws that enable them to get a firm grip on the smoothest bark.

This completes our tally of British Weasels, though, as we shall see in the next chapter, there are really two more—the Otter and Badger—which are closely related to the same family. Despite their implacable ferocity (or because of it) they form what is, in many ways, the most fascinating group in the British list: admirable for their elusive grace, their poise, and rare good looks. They are so versatile in their methods that once they have singled out their quarry no obstacle or set-back will baulk them in their chase. They can run, leap, burrow, climb, and swim with equal skill. Whether in deep holes underground or high in trees or far out in mid-stream, there is no escaping their relentless pursuit. We are wrong if we think them merciless: they only do the savage work for which they were intended. They are the true hunters of the wild.

CHAPTER XIII

GREATER HUNTERS (OTTER, BADGER, FOX, WILD CAT)

TO hunt, they say, is to be hunted. The smaller the animal, the more numerous its enemies are likely to be. On the other hand, the larger the animal, the more likely it is to find itself in conflict with that most dangerous of all enemies, man. Stoats and Weasels may be shot at sight, yet no one ever dreams of organizing a regular hunting-party to track them down : they are too insignificant to be worth troubling about—beneath the dignity of true sportsmen. But every county has its pack of fox-hounds. Otter hunts are still maintained in many districts. Badger clubs, though not so common as they were, are not unknown in some villages ; and in Scotland lairds and gillies form bands to trail the Wild Cat to its lair.

It is with these four animals, Otter, Badger, Fox, and Wild Cat that this chapter deals. Widely differing as they are, it is convenient to treat them as a group, if only because they have all, in their separate ways and on account of their size, been turned into outlaws—fugitives from the advance of civilization. Admittedly they are not the only ones. Deer-stalking and hare-coursing provide a fair amount of sport, but the case of the four animals in question is rather different. They are hunted, not for their flesh, but either because they are themselves predatory, or because they are capable of giving their pursuers ‘ a good run for their money ’. This is no place in which to enter into any arguments for or against blood-sports : as to that you must form your own opinion. Man is by nature himself a hunting animal, though whether he is justified, merely for

the sake of amusement, in taking advantage of creatures less well equipped than himself, is another matter. To pit oneself against the mammoth with nothing better than a self-made sling and flint-tipped arrows was one thing. To dress up in top-hat and tail-coat and ride with the hounds—to bring motor-cars, guns, telescope, and other ingenious paraphernalia to compass the destruction of some small and comparatively defenceless beast, is quite another. It is a strange thing that man, who is so kindly and considerate to his own kind, so quick to pity those in distress, should so often stoop to such ignoble practices.

Must we, then, pity the hunted Fox? Not always. In most countrysides he has a fair chance of making good his escape; and were it not for the fact that he has been so long preserved in the name of sport, he would be much rarer than he is to-day. Fox-hunting as a popular feature of English rural life dates from the early days of the eighteenth century. John Peel was not the first old English gentleman, nor the last, who gloried in the chase. The tales that are written and told of record runs, of the day's adventures from the morning 'View halloo!' to the kill at sunset, would fill a library. Of all British animals we must credit Reynard with the greatest intelligence. His cunning in a tight corner surpasses belief. A weary Fox, realizing that he is hard pressed and cannot stay the pace much longer, will resort to all manner of stratagems: smear himself in wet manure to cover up his scent—climb trees and leap sideways so that his pursuers find the trail broken—or even follow the fresh trail of a second Fox to baffle and bewilder the dogs in his rear. He lopes rather than runs, his white-tipped brush held stiffly at an angle, his tongue lolling out like a winded dog's. His staying powers are extraordinary: up hill and down dale he toils, sometimes over half a county. Only when the worst comes to the worst does he think of

running to earth, often into the depths of a badger sett, or in some den of his own. Then begins the dastardly business of digging him out—terriers, spades, and smoke fires combined to bring him to bay so that the half-crazed pack may tear him to shreds.

So death comes to many a Fox ; and maybe justly, considering what a rascally knave he is. Yet no one, seeing him, can deny that he is handsome and *most* attractive. The furtive roguery in his eyes is hidden behind a mask of blandest innocence. In face and figure he is rather like a large dog, only his snout is much sharper and there is no mistaking the rich orange hue of his fur. His brush, too, is much thicker than any dog's tail : he uses it as a rudder when he runs.

Because of the dangers which beset him, the Fox has become strictly nocturnal in his habits, lying-up during the hours of daylight and slinking out at dusk. He has his own regular 'beat', and except during the mating season, when he goes in quest of the vixen, keeps to it. He is a silent, solitary hunter, relying more on surprise than on speed, living mainly by his wits. The artfulness and audacity of a hungry Fox are well-nigh proverbial, as any countryman will tell you. New-born lambs, turkeys, and geese, poultry of any kind—nothing is safe when he is on the prowl. The farmer may lie in wait for him, shot-gun trained on the entrance to the poultry pen, but Reynard knows a trick worth two of that—for once he fails to put in an appearance. Quick to take the hint, he goes raiding elsewhere.

There are many tales of the queer idiosyncrasies of the Fox, enough to fill a book. Most amusing of all is that which relates to his ingenious method of ridding himself of fleas. Every animal has its own peculiar brand of parasites, but the Fox, not being very particular in his personal hygiene, has more than his fair share. When these fur-



THE RABBIT GRINDS ITS TEETH—
BUT NOT IN ANGER.



LEVERET IN ITS FORM.

THE RED SQUIRREL IS A GREAT
FOOD-HOARDER.



DORMOUSE FATTENED UP FOR
ITS WINTER SLEEP.



GREY SQUIRREL, AN ALIEN,
BUT QUITE AT HOME.

PLATE XI

mites become unbearably troublesome, he is said to enter a pool, wading in inch by inch until his whole body is submerged. The fleas, for fear of drowning, hop away as the water rises about them and crowd on to the tip of his tail, which he leaves protruding above the surface. Satisfied that he has rid himself of most of them, the Fox leaps clear of the water and goes his way cleansed. This may be nothing more than country gossip. I know of no one who claims to have seen it done, but it sounds very far from being improbable. Some people say that he will lure hens down from their roosting perches simply by out-staring them ; and my own observation confirms the truth of this as the following incident will show.

One morning in January I was watching wild-duck on the marshes when I noticed an unusual commotion among a bunch of teal that were swimming close in to the frozen fringes of a reed-bed. They gabbled softly among themselves, all agog with suppressed excitement. Presently the sedges parted and out poked a ginger-and-white snout—a Fox ! At this there was a fresh stir among the ranks of the ducks ; but instead of flying away they only quacked the louder and drew closer, ranged in a crescent ; where-upon the intruder grew bold. The Fox, in his most non-chalant, off-hand style, crept out on to the ice, folded his tail beneath him and sat down in full view of the teal, which now were grown quite frantic, surging restlessly to and fro in a crowd, whistling and muttering at him, apparently in derision. The Fox took no notice of them whatever : he proceeded to lick his chaps and groom himself as casual as could be, like a dog in front of a fireside ; but all the time I could see him measuring the distance out of the corner of his eye. Nearer swam the unsuspecting ducks . . . nearer. Without warning there was a splash, a flutter of air and spray ; the Fox had sprung, pinning one of them under his fore-paws ! For a moment he floundered in the

shallows ; the next he was out again with the teal gripped securely in his jaws.

While the Fox is very fond of fowls and other live-stock he is not above hunting for lesser game. He searches diligently for field-mice, voles, and rats, and is not averse to sampling carrion when he finds it. Having once located a nest of rabbits, he digs straight down and rifles it. In all his moves he is utterly stealthy, a most careful stepper among the broken twigs of the underwood which is his home ; sometimes seen in the twilight, but never heard. If he barks it is only to advertise his presence to the vixen. To her most of the credit must be given for rearing the family : Reynard, gay dog that he is, will have little to do with them. Some dog Foxes are more attentive than others, however. Recently I came across a case in which the vixen came to an unfortunate end : she was run down only a quarter of a mile from her den and killed before the dogs could be called off by the huntsman. Instead of deserting the litter, as everyone expected he would, the old dog Fox took charge at once and succeeded in rearing his family without any further mishap occurring. The cubs are born in March and the mother remains with them throughout the summer, leading them through the covert on hunting expeditions for mice or voles, and teaching them all the tricks of their trade.

That the Fox is a trickster no one will deny, nor that he is wantonly destructive ; but who shall say that the Badger is anything but a harmless, inoffensive beast ? Yet for centuries 'Old Brock' has been subjected to the most hideous tortures on the trumped-up charge that he causes damage to poultry and uproots crops—that he is a good-for-nothing. Any excuse is good enough to flay a dead horse, but it is a lasting disgrace that Badgers should thus be persecuted. Possibly one or two among them *are* rogues : they may take an occasional chicken or dig up expensive

bulbs ; but is it right that they should all be treated as criminals just because of a few trivial misdemeanours ?

Examine the Badger carefully. He has a stout, thick-set body, and a very broad back. His fur is coarse, grizzled, suggestive of great strength. He is short-legged and flat-footed : obviously built more for comfort than for speed. His snout is broad, square-boned, the jaws so powerful that they can bite clean through a man's hand. At first glance the most striking feature about him is his white cheeks heavily barred with black ; but you will notice also the long curved claws, useful for digging, and the general air of toughness and endurance about him. No British animal has a thicker hide than the Badger. His appearance is distinctly bear-like and he has, in fact, been described as the 'last of the British bears' ; but appearances can be deceiving : actually he is closely related to the slender, more agile Weasels. His gait, too, is not unlike Bruin's—shambling and slouching along always with his nose pressed close against the earth. At twilight and through the darkness, particularly on moonlight nights, he roots about the wood-edges, never far from the cover of bushes or undergrowth ; grubbing for an assortment of foods—slugs, beetles, berries, worms, birds' eggs, young rats, or mice. He has a special weakness for wild honey, and will spend hours scraping out the sugary combs of a wild bees' nest, regardless of the stings of the enraged insects.

Like the mole, this animal makes his home underground, but a Badger sett is far more extensive and more intelligently planned than any mole's fortress. Not only does it possess separate chambers in which the Badger may eat and sleep and store his food—something akin to our dining-rooms, bedrooms, and larders—but it is even claimed that he digs out a separate burrow for his lavatory. Certainly Old Brock is one of the cleanest of wild creatures. He seems to have a passion for spring-cleaning ! At the end of his winter

drownings, usually in March or April, he brings out all his bedding and piles it at the entrance to the sett. Then he sets to work to fetch a fresh supply of hay and straw from the nearest stubble field, and with this he lines the interior and makes it sweet and hygienic again. Often the presence of so much disused material (as much as would fill a largish wheel-barrow) is the means of betraying the fact that the Badger is at home and leads to a disturbance in his domestic happiness. Either the keeper comes with his terriers, or else there are other intruders, as often as not the Fox. Very often, you see, the wandering dog Foxes have no homes of their own and a Badger sett provides convenient and comfortable lodging. You might think that Reynard and Brock would scarcely make the best of bed-fellows, but all Badgers are peaceable, good-natured creatures, ready to put up with almost anything. Cases of Badgers and Foxes (and for that matter rabbits as well) sharing the same sleeping quarters are by no means uncommon. Doubtless there is room and to spare for all in the rambling system of caves and passages underground. It is only when some decrepit, mangy Fox foists himself upon their household that Badgers take offence. Being cleanly creatures themselves, they naturally resent the presence of so unsavoury an interloper. If the stench grows positively unbearable they may even desert the sett altogether, returning later when the offensive Fox has departed.

At most times of the year the Badger is a silent species. He is a great sleeper, and when the winter turns really severe it is his custom to retire into the innermost fastness of his sett, curl himself up in straw, and snooze away his time until the return of warmer weather. In the northern countries of Europe Badgers hibernate for four or five months at a stretch, but in England a mild evening in December or January will find them out and about, particularly in our Southern counties. In February and March

the two sexes ('boars' and 'sows') come together, and then they are more vocal, grunting, growling, and yapping as they spar and tussle for their mates. These love frays are often quite vicious, and the contestants often carry their scars for the rest of their lives. The young ones, usually three in number, are guarded most jealously by the sow, who tends them with scrupulous care and carries them to a fresh nursery as soon as the old one becomes soiled. Mr.

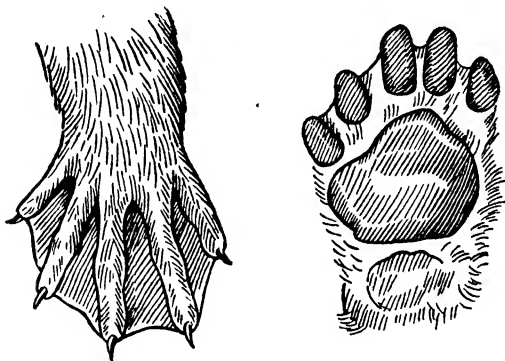


FIG. 11.—Otter pads.

and Mrs. Brock set out each evening together to bring them food, ranging far and wide in search of suitable tit-bits. But, generally speaking, Badgers are distinctly home-keeping in their habits and rarely wander far afield. On warm days they love nothing better than to lie and bask in the sun, though never very far from the entrance to their bolt-hole. A pity, really, that they are so often disturbed.

Very different is the life of the Otter, itself closely allied to the Weasel family as its sinuous shape suggests. It is a Weasel that has taken to hunting in the river, but much more recently than the Seals, apparently, for although its feet have become webbed, it has not yet lost the use of its

hind-limbs. On shore it can still run and frolic as nimbly as any Stoat, and a group of Otter whelps gambolling with their dam on a bankside is as charming a sight as one could wish to see. You will be lucky if you do see it, however, for the Otter, like the Fox and Badger, is largely nocturnal. It is a skulker, almost completely submerged as it swims, its eyes awash and only its nostrils and the top of its head showing above the surface. At the first hint of danger it dives, travelling long distances under water and only showing itself when the coast is clear. It is quite common on many a river or where it is said to be unknown. In winter, when fish are scarce upstream, it resorts to tidal estuaries of such rivers as the Thames, Severn, and Humber ; but what Londoner ever claims to have seen one sneaking under Westminster Bridge, or in the lamplight under the Embankment ?

Otters are great wanderers, their whole lives being spent in exploring one waterway after another. Magnificent beasts they are, too, measuring as much as four feet when fully grown, and finely proportioned. Perhaps their most striking features are their sinewy taper tails, which are exceedingly muscular and powerful, anything from fourteen to twenty inches in length, serving as oars and rudders combined. The Otter's skull is much flattened, the muzzle arrayed with rows of stiff, quill-like whiskers. Its body is supple and seemingly boneless, allowing the swimmer to twist and coil in the water as lithely as an eel. It is clad from head to tail in a close, soft under-fur, covered with an outcrop of longer, coarser hairs. As with the Fox, there is a good deal of variation according to the age of the individual, but usually the colour is best described as a rich umber brown, with the chin, throat, and neck a pure silver-white.

Otters live largely on eels, which they pursue with great vigour, biting them from beneath across the gills ; but

they are not averse to sampling other fish, and are quite capable of tackling and dispatching a twenty-pound cock salmon. They also dispose of large numbers of frogs. During periods of hard weather they are known to return to the land, there to track down rats and rabbits; and should any unwary waterfowl come within reach (moorhen, wild duck, or coot) it is quickly snapped up. A swirl in mid-stream—an eddy of waves—a squawk—and the bird disappears under water in a whirl of wings.

Big fish are eaten piecemeal, the Otter tearing off strips of flesh from the plump middle and selecting the choicer cuts first. He begins at the head and works towards the tail; but often his meal is interrupted and he has to leave his fish unfinished—tell-tale evidence of his whereabouts. An unfortunate oversight, this, a habit which frequently rouses the ire of the fisherman and the water-bailiff. Because it is partial to a fish diet, the Otter is accused of being a poacher and treated accordingly. Judgment of this sort is worse than unjustified: it betrays the short-sighted, mean, and stupid attitude of a selfish minority of so-called sportsmen. Certainly the Otter kills fish, but it has yet to be proved that his presence in any river is in itself responsible for any serious reduction in their numbers. In any case one Otter is worth a hundred thousand fish.

Otters pair in midwinter, and the young ones are born in the 'holt' (usually a natural hole under the roots of some waterside tree) in early spring. The whelps are blind for more than five weeks, and are suckled by the bitch Otter until they are over four months old. The old dog Otter rarely plays any part in helping to rear them. They remain with their mother until the late summer, undergoing a period of careful training. Strange as it may seem, they are at first very reluctant to take to an aquatic life; they whimper and draw back when first led into the stream. In late autumn the family parties divide and the youngsters

go their own ways, roaming to the moorland watersheds and down to the lower reaches as far as the seacoast. Those who would follow their gipsy career in detail, if only in imagination, must read Henry Williamson's entralling tale of *Tarka* : a story of wild-life adventure unsurpassed in our language.

Last, rarest, and most formidable of all, is the ferocious Wild Cat. Of its private life little is certainly known. Must I confess that I have only seen it once in its natural haunts and then only for a brief glimpse ? That was one evening in July, high up on the bare slopes of Ben MacDhui in Inverness-shire, well over four thousand feet above sea-level : a stealthy figure slinking among the rocks as it stalked the hidden ptarmigan ; gone almost as soon as I got my field-glasses focused upon it. You may see it caged in most Zoos and know it for what it is : a devil on four legs, a furry spitfire, a fury. Yet outwardly it bears a close resemblance to the homely tabby of the fireside, rather more heavily built, perhaps, with a more tigerish head and thicker tail, but otherwise almost identical.

The Wild Cat is said to hunt in much the same way as the domestic cat does, gliding along noiselessly, picking its way carefully, and using eyes, ears, and nose as it hunts ; then suddenly bounding forward on its unsuspecting prey. It has been known to kill creatures as large as young lambs and roe-deer fawns ; and because of its deadly powers has always been detested by gamekeepers and the landed gentry. It has two litters in the year, the first in spring, the second later in the summer. The kittens follow their mother closely until they are able to fend for themselves, but the father (is a male Wild Cat a 'Tom' ?) appears to take no interest in his offspring, and leads a solitary existence throughout the greater part of the year.

Originally the Wild Cat was a forest dweller, but because of its depredations it has been harried and exterminated

from all its old tree-haunts in England, Wales, and Ireland. To-day only a handful survive, confined to the wildest, most inaccessible districts of northern Scotland. There they pursue the blue mountain hares, the white-winged ptarmigan, and the hillside voles. Occasionally they may creep down to the fir-woods to take squirrels and rabbits, but for the most part they are exiles, driven to a fugitive life on the treeless slopes of the high glens, where only the wiry heather blooms and the wind blusters among the desolate corries : haunts of the utmost wastes.

CHAPTER XIV

SEALS

IT may seem strange at first to find such gentle-looking creatures as the Seals being ranked next in order to the pitiless Weasel, the wily Fox, or the furious Wild Cat. With their smooth, sinuous bodies they look more like mermaids than wild beasts, and their dark, intelligent eyes give to them a gentle, almost woman-like expression. They look so pathetic, so helpless, that we can scarcely credit that they are really akin to the other hunters of blood. It is easy to imagine that the savage Walrus (now practically extinct though once a visitor to our northern coasts) is a carnivorous species . . . but surely not the Seal !

Yet the truth is that Seals *are* flesh-eaters. The sole difference between them and other carnivorous species is that they have chosen to lead an exclusively marine existence and so have come to be far more specialized. In the same way that the Otter has taken to the rivers because of his taste for fish, so the Seals have taken to the sea ; only in their case the process of evolution has been at work so much longer that in many respects they have become strangely transformed. The most striking change is that which has affected their hind-legs. These have been used so much in swimming that they are now turned *backwards* and pressed close against the tail. If you think of the way fishes and whales propel themselves through the water you will realize the advantages of this change of function ; but another result of it is that these limbs have now become almost useless for other purposes. When it comes to walking, the Seal has to wriggle and squirm along on its belly, hoisting itself forward by means of its fore-legs. Not that

the latter are very much better ; they, too, have changed so much that they are little more than flippers, scarcely strong enough to support the enormous weight of the body. If, however, you examine these legs more carefully, you will be forced to admit that they are indeed those of a typical predatory animal. The webbing of the fore-paws is broader

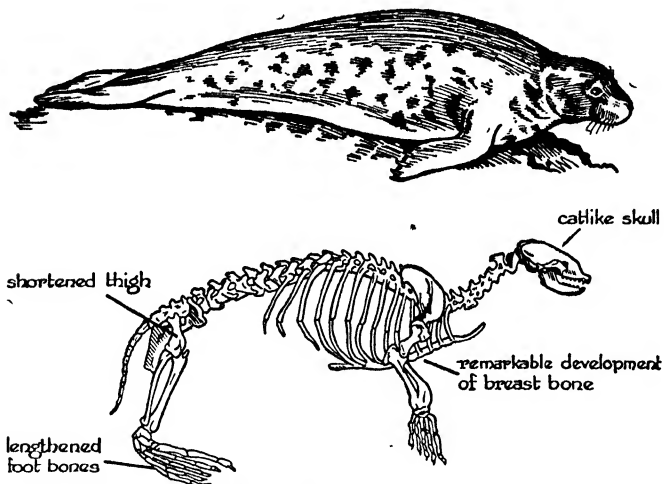


FIG. 12.—Outwardly the Seal appears to have lost most of the typical quadruped's features. Its skeleton, however, reveals striking resemblances to its near-relatives, the Carnivores.

than that of the Otter, but the five fingers are still there *and* the cat-like claws. Even the hind-legs are provided with claws of sorts, though these are so degenerate that it seems improbable that they are ever used. In fact the more you study the structure of the Seal the more you realize that it is slowly undergoing the same fate that has already overtaken the Whale. In its endless quest for fish it is itself becoming fish-like. The chances

are that eventually it will lose the use of its hind-limbs completely.

There are other points of similarity between Seals and Whales that seem to point to the same conclusion. The first is the absence of an outer ear (or concha). The second is the development of an internal nostril-valve which closes automatically when the Seal dives, thus enabling it to remain beneath the surface without sea-water entering its lungs. In the third place, just as the Whale has no 'neck', so the Seal appears to be in the process of losing his. The head is joined on to the body so closely that it can be turned from side to side only with difficulty. Another point of similarity is the possession of blubber—the growth of a thick layer of oily fat that envelops the body and serves to keep it warm. Admittedly the Seal has so far not shed his covering of hair, though his fur (sealskin) has grown much shorter and smoother than is normal with other animals. Seals have not yet attained to anything like the dimensions of the great Whales, but they show a distinct tendency to unwieldiness and to 'put on weight'. An old Atlantic Grey Seal, for instance, will measure upwards of eleven feet and tip the scales at well over a third of a ton.

These similarities are very far from being accidental. In both cases they must be attributed to a common cause—life in the sea. To a lesser degree similar developments can be observed in human beings who have trained themselves to become expert swimmers. Did you ever see a photograph of Captain Webb, the first man to conquer the English Channel? If not, then think of some other champion, or anyone you know who has won prizes for long-distance swimming. Could you truthfully describe him as a light-weight? Compared with a sprinter, is he not rather plump? And which are proportionately the longer, his arms or his legs? Are not his chest and shoulders bigger and broader than is usual with men of his size?

Unlike the Whales, Seals have not yet reached the stage of being able to spend their lives permanently in the water. They are compelled to come ashore in order to rear their young, and, whatever the season, they are fond of basking full-length in the sun, either on some surf-ringed reef or on a lonely spit of sand at low tide. Because of their clumsiness on dry land they choose the most inaccessible places in which to indulge in these noonday siestas. Steering towards the edge, they hoist themselves out by means of their fore-paws in very much the same way that a man lifts himself out of a swimming-bath. Having reached their favourite ledge, which is rarely more than a yard or two from deep water, they will lie there hour after hour in a deep daydream. After their strenuous jostlings with the waves, they like to take things easy awhile and enjoy a comfortable snooze. Seals are eminently sociable animals, and are not usually found alone. They are well aware of their painful awkwardness when out of their natural element, and so are firm believers in the saying that there is safety in numbers.

If we were to visit one of these meeting-places, preferably on the west coast of Scotland or Ireland, what should we see? Picture a lofty headland or a cove enclosed with precipitous cliffs—craggs fissured with black gullies—caves through which the sea swirls at all states of the tide, clutching at their walls with its green fingers, rearing its white crests at their roofs, thundering, exploding in their dark interiors. No boat could live in such a cauldron; yet, looking down, we can see heads rising and falling in the deep troughs of the swell, like half-filled bottles that float upright in the river. Sometimes these heads disappear, sinking gradually beneath the surface. Those are the Common Seals. Others roll on their sides and dive like Porpoises—the Grey Seals. Then we catch sight of something we had failed to notice before—a number of recumbent figures stretched out here and there on the bare slabs. See

at the entrance of the cave yonder, a dozen together, and all shapes and sizes. From this height they look no bigger than slugs on stones ; and their blotchy colouring renders them practically invisible against the background of marbled granite. It is only with the assistance of a pair of powerful binoculars that we shall see them properly. Already the old bulls are suspicious ; we can see them looking up at us, hear their grunts of disapproval as they prepare to shuffle from their ledges . . . and over they go, head-first, splashing into the depths. In such a spouting sea as this the most powerful human swimmer would quickly be sucked under or battered to death against the rocks, but not such master-mariners as these. Regardless of the tide-race, they make their ways under water, and when they reappear, several minutes later, they are more than two hundred yards out to sea (or farther than that, for frightened Seals may remain under water for more than a quarter of an hour at a time). Others, more indolent than these wary ones, remain behind. How round and domed the tops of their heads are ! A glance is enough to suggest that their brains must be well developed. Their eyes are full of brooding intelligence : such black, liquid eyes they are, filled with mute and tender appeal. They look up almost imploringly, as if begging us to do them no injury. Or is it just a sentimental fancy which causes us to interpret their looks in this way ?

Whatever the answer to that question may be, there is no denying that our British Seals have suffered cruelly at the hands of man. Fisherfolk dislike them because they disturb the fish-shoals. ' Sportsmen ' have found them sitting targets for their rifles. Their breeding colonies have been invaded, and when the loyal parents, instead of escaping, remained to defend their helpless puppies, they were clubbed on the head and murdered. In some places they have been deliberately hunted for the sake of their

valuable skins ; in others for their flesh and blubber . . . the old, old story of barbarous and merciless war waged on wild creatures incapable of defending themselves. A shameful business—for to slaughter a Seal in cold blood is almost as brutal a deed as to kill a man, and far more cowardly.

It should be understood that such a communal gathering as this, with young and old of both species mingling indiscriminately, could only be seen outside the breeding season. When September comes there is tremendous excitement among the full-grown Seals, which splash together, barking at one another and sparring in the water. Common and Grey Seals now no longer share these common playgrounds, but resort to their age-old sanctuaries, where they can engage in the serious business of mating in complete privacy. As the breeding habits of the two species are by no means as alike as might be expected, it will be simpler to describe them in turn.

Of the two, the Common Seal is much the smaller. It rarely exceeds six feet in length, and is usually nothing like so big as a man. Its coat is yellowish, covered all over with darker patches which produce a dappled effect. There is, nevertheless, a great deal of individual variation : some Common Seals are more heavily marked than others, particularly on their backs, which are often quite blackish. Most of their courtship and pairing is conducted in the sea, though in the heat of their ardour the old bulls will at times follow a female ashore and fight fiercely to decide who shall possess her. They low, they cough at each other, they growl ; but though passions and jealousies run high, their behaviour at this time is largely promiscuous. The male does not select one particular female and remain with her throughout the rest of the year. Once the courtship is consummated there is no question of the pair ' living happily ever after '. After a few hectic weeks the excitement dies down, and they forget all about each other. Nevertheless

the sexes remain together in the common crowd until the following midsummer. Early in June the pregnant females, feeling that the time is at hand for their young ones to be born, retire to the depths of some inaccessible cave, where they form a separate herd. There, almost within reach of the plucking tide, on a ledge of rock that is drenched with the salt spray, the calf Seal is delivered. Immediately after its birth it sheds a jacket of fleecy white wool, and in its mottled coat looks like a tiny edition of its mother. Soon it begins to put on blubber at an enormous rate. Though it can take no food but its mother's milk for several weeks, it quickly takes to the water and swims with ease. It grows surprisingly quickly, until by the end of August it is strong enough to take part in the general rough-and-tumble with the rest of the colony.

Very different is the life story of the Grey Seal infant. It is born towards the end of September or in wild October, when the Atlantic storms are working themselves up to the fullest pitch of their fury. To make matters worse, its nursery is usually situated on the most desolate and exposed parts of the coastline ; for Grey Seals, being more weighty and more powerful than the lesser species, love to sport in the roughest seas. Therefore they choose the most turbulent headlands and rocky islets for their breeding stations. This may help to account for the extraordinary behaviour of the tender little one. Instead of shedding its woolly white jacket and taking the plunge immediately, it remains on shore, obstinately refusing to budge, almost as if it knows that it is not yet ready to enter the icy waves. For nearly two months it retains its protective covering of snow-white fur, by the end of which time it has become a swollen ball of fat. At that age it peels out of its fur, and for the rest of its life is seen only in sleek sealskin ; but it still remains dependent upon its mother, who suckles it for more than six months. During the whole of this time it behaves as

though it were to spend the rest of its life as a land animal ; and being curious, like all young creatures, it is frequently tempted to explore. Those that are born in open situations often stray considerable distances overland, for their mothers cannot be with them all the time, so that we may well imagine that there are many anxious moments and many a mishap before they are at last safely embarked on the open seas. Eagles, foxes, and men are only three of the possible enemies that may come upon them while they are still in this prolonged stage of defencelessness. Obviously it is of the greatest importance that the old Grey Seals should choose a site that will be, as far as possible, utterly unapproachable.

Having safely withstood the dangers and rigours of its wintry babyhood, the young Grey Seal grows out of its puppy skin and dons a third and final coat, which is very much the same as that of the adults. But though spring has come and the youngster is now seven months old, it is still not ready to leave the land to which it has by this time grown to be so attached. No doubt if only it received food and attention it would be perfectly content to spend the rest of its days ashore. Even when it is weaned, it is still loath to follow its mother into the water or to embark on its first fishing expedition. Sheer hunger and neglect eventually force it to leave the shore. At first it cries out in protest, whimpers, and bleats in distress. Time and again, when it has been tempted towards the tideline, it waddles back on to the soft sand, away from the hateful wetness. The old one flips over on her side, luring the faint-heart on, perhaps with a succulent flat-fish clenched in her jaws, bidding the young one try again. In the end, of course, it does and is soon valiantly battling its way through the choppy waves as skilfully as though it had never done anything else from the beginning.

What a contrast there is between the unwilling baptism

of this seemingly overgrown baby and the happy abandon of the new-born Common Seal! Nevertheless, a little consideration will suggest that there are obvious and very good reasons for this apparent backwardness on the part of the young Grey Seal. Its performance is also a reminder of the fact that all Seals were originally land animals. The old instinct to keep to the safety of *terra firma* is still inborn, and the aversion to a watery life has to be overcome by each new generation.

Grey Seals lead much the same sort of life as the lesser species, but because of their greater size they range farther and capture larger fish. At a distance they can always be identified by the way they dive, turning turtle and plunging, whereas the Common Seal always sinks bodily, only rolling on its side when it is completely submerged. At close quarters the difference in size is unmistakable. The yellow-white under-parts of the Grey Seal are more boldly mottled with black, and the upper-parts, particularly the head, are often a uniform grey, without heavy markings. There seems, too, to be a marked difference in the temperaments of the two animals. Whereas the Common Seal is quiet and docile, a playful fellow, the Grey Seal shows every sign of being a surly, not to say a vicious brute. The old bulls in particular are very morose and spiteful, especially during the breeding season (September) when they battle among themselves with tooth and claw in order to acquire considerable 'harems' of females. In this respect they may be compared with the polygamous Red Deer stags, which are equally overmastering in their courtship habits.

Apart from one place (the Farne Islands in Northumberland) there are no breeding stations of the Grey Seal in England. A few Common Seals may still be seen at home in one or two localities of Devonshire and on the mudflats of the Wash, but for reasons which have been mentioned

previously, they lead a somewhat lingering existence. Elsewhere in this country we can only hope to see them in winter when hard weather and shortage of supplies drive them southwards in search of the shoals. Then, perhaps, one or two come close inshore, and it is possible to watch them at their sport from the promenade or pier of some seaside resort. On the east coast these winter visitors will almost certainly be Common Seals. On the west coast either of the two species may be expected.

It is to the Atlantic coasts of Ireland and Scotland that we must nowadays go, however, if we really wish to study the private lives of Seals with any intimacy. Elsewhere they have become the victims of modern civilization, misfits in a world of towns and ships and guns. Only on those far-off rugged coasts, where the ocean rollers thunder majestically towards a lonely land, can the Seals hope to find haven and refuge. There, under the dark headlands and on salt-sprayed islets, they live the strange life for which they were born.

CHAPTER XV

DOUBLE-TOOTHED RODENTS (RABBITS AND HARES)

EVERYONE knows the Rabbit—or thinks he does. It is to be found almost anywhere: in fields near towns, in dunes by the seaside, even on the higher slopes of the mountains. Though it may not be the most populous of British wild animals (both Field Mouse and Rat far exceed it in number), it is the one that is most often seen. But how many people can claim to have studied the Rabbit's ways or watched it long enough really to 'know' it?

Next time you have a Rabbit for dinner, examine the inside of its mouth. You will observe that the two front teeth in both its upper and lower jaws are long and curved, with a sharp cutting-edge very much like that of a chisel. These are the incisors, the teeth of a typical gnawing animal. But look again. Immediately behind these incisors, rooted in the roof of the mouth, you will find a smaller pair of similar teeth. It is these that distinguish the Rabbits, and the Hares, too, from the other Rodents—the Mice, Rats, Squirrels, and Voles—that belong to the same general class of animals. In both groups you will note the complete absence of the canines (or 'dog-teeth') and that there is a vacant space between the incisors and the molars (or 'back teeth'). This is what produces that pouchy look about the face so typical of all Rodents.

Now this is a detail worth considering, for it provides a most important clue to the secret of the Rodents' way of life. These powerful incisors, coated in front with hard enamel, are not like ordinary teeth: *they continue to grow*

throughout their owner's lifetime. That is why the Rabbit seems to be forever munching, why his jaws are all the while at work even when he is not actually eating. He *dare not* leave off grinding his teeth! If he did his front teeth would soon grow too big for his mouth. Should even one incisor suffer an accident—get broken, say—the result is fatal, for then the opposite tooth lacks the necessary surface against which to grind. Rabbits whose teeth are malformed or whose lower incisors have grown to such a length that they have penetrated the brain, are by no means uncommon.

Despite its numbers, the Rabbit is not, strictly speaking, a British animal. To the Ancient Britons, certainly, it was unknown, and the Anglo-Saxons knew it as the 'coney', a word that they borrowed from the Latin 'cuniculus'—etymology which suggests that the Romans may have first introduced it into this country from abroad. History shows, however, that it was not common until well after the Norman Conquest, and it is only during the past three hundred years that it has come to be so common and so widespread as it is to-day. Even a hundred years ago it was practically unknown in the Highlands, where it is now as flourishing as it is in other parts of Great Britain. How are we to account for this ability of the Rabbit to colonize districts where it was previously unknown? Everyone knows something of the phenomenal increase of the Rabbit in Australia, how it was introduced by the early white settlers, and how in a few decades it multiplied so enormously that it threatened the welfare not only of the native wild-life but also of the sheep and cattle of an entire continent. The main reason for this extraordinary increase is that the Rabbit is a most prolific breeder, having as many as eight litters in a year. It is quite common to find a nest of young ones in December or January, and in a dry, warm climate, such as Australia's, for instance, the species is capable of

breeding non-stop all the year round. What is more, the young ones mature in a very short time, and at six months old are quite ready to take mates of their own—and so it goes on. A secondary cause for their success under modern conditions is the comparative absence of natural enemies. In the old days there were birds of prey—buzzards, kites, and harriers—and more than one species of carnivorous beast—polecat and marten—to keep their numbers down. Most of these have now been all but exterminated, and apart from the stoat and, to a lesser degree, the fox, the rabbit is left to monopolize the field. As a consequence it has in many places become a distinct nuisance, damaging crops, contriving everywhere to break through the farmer's wire-netting enclosures : another example of how man's lack of foresight has upset the balance of Nature.

Who ever heard of Brer Rabbit living by himself ? Not he : of all the animals he is the most sociable. Some warrens are age-old, occupied by hundreds of individuals, the earth riddled and honeycombed with a network of well-trodden passageways. It is worth while taking up a position overlooking such a place in order to observe how the community behaves. Rabbits feed chiefly at dusk and at dawn, so it is advisable to be safely ensconced about sunset. Then, one by one, they may be seen appearing at their exit holes, there to wrinkle their noses at the air, testing it for danger, and then go bobbing across the short-cropped greensward, nibbling it as they go. They jump rather than walk, moving jerkily and then crouching with their long ears laid flat upon their backs. (And you will note that their ears open backwards—the mark of the hunted beast.) There is something excessively timid about their gait, yet it is perfectly unhurried. Big ones, tiny ones, each goes its own way, apparently taking no notice of its fellows. If you cough or suddenly wave your hand you will see how one of them—an old buck as like as not—sits bolt upright,

drumming on the earth with his hind-foot to warn the others. Next moment he is racing back to his burrow, his white scut bobbing conspicuously—signal for a general stampede ; and one by one they take the hint, jerk up on their haunches, and bound away to their various bolt-holes. Fine sprinters they are, too, speedy over a short distance ; but once they are cut off from their usual line of retreat they quickly tire and are soon run down by almost any dog. Nor can they be said to be very intelligent : the least thing is apt to fluster them, and when bewildered they often behave in the silliest fashion. At most times they seem to be indifferent to danger, and will not flee until it is actually imminent.

There is very little time or place for family life in the Rabbit world. Bucks and does mate together throughout the four seasons, but it is doubtful whether the pairs remain together for long. Probably there is a good deal of promiscuous behaviour down there in the darkness of their communal home. But when the time comes for the young ones to be born, the old doe retires to a place of her own, usually at some distance from the main warren. There she digs out a fresh tunnel, usually not more than three or four feet in the ground, excavating the earth and shale with her fore-paws, and scrabbling it away with strong kicks of her hind-legs. At the end of this tunnel she hollows out a circular chamber. That done, she at once proceeds to line it with the blue-grey downy fur which she tears wholesale from her flanks and underparts until at last a perfect nest is prepared. In it her litter is laid—five or six, or even as many as eight at a time. Curiously repulsive little mites they are at birth—pink, naked, blind, and so delicate that it seems the first breath of frosty air would shrivel their tender flesh. For the first day or two the old doe remains with them. After that she covers them only at night, leaving them at dawn to resume her normal daily life in the warren, but carefully stopping up the entrance with

loose earth each time before making her departure. At regular intervals she returns to suckle her family, and on each occasion this same procedure is repeated. The old buck is never allowed to know where his mistress's nursery is situated : and so, when the time comes for the young rabbits to join the ranks in the warren, their sire cannot even tell which are his own offspring—not that he cares ! There are many queer stories about the breeding habits of Rabbits—of how the bucks are so jealous that they turn cannibal and devour their own litters ; and how, if her young ones are disturbed or suffer interference at human hands, the doe will eat them alive. Instances of this sort of behaviour are well known to keepers of tame Rabbits, but among wild ones such horrible practices are probably the exception rather than the rule. Certainly those that have come under my personal observation have given the impression of being models of affection.

The young ones are scarcely weaned before the doe leaves them to look after themselves. Probably at one time or another you have seen some of these precocious tiny fellows, often no bigger than a man's fist, snipping away at the grass outside their burrows and looking very much at home. And so, no doubt, they are ; for a Rabbit's existence is just about as simple as life can be—nothing more to it than eating grass and making sure not to stir out of easy reach of the nearest bolt-hole. An unimaginative routine. Even so, the death-rate among these inexperienced juniors must be very great. Often in the course of country walks I surprise and catch them—little innocents that have left it too late, grown so confused and terror-stricken that at the last moment all they can do is to lie quivering, waiting for me to pick them up—which invariably I do, if only to admire the dark beauty of their eyes (like bubbles of limpid water) and the softness of their khaki-and-rufous fur. Thousands are worried by cats and dogs, and who can

estimate how many more are accounted for by the wily fox, malicious stoat, not to mention rats ?

If such a state of affairs seems over gloomy, one must remember that this slaughter of the innocents is very necessary. If it were otherwise, Rabbits would very soon overrun the entire country. As it is, there are several counties where they have to be trapped wholesale in order to keep them within proper limits. Defenceless as they are (apart from their hind-legs, which are capable of administering a kick sufficient to stun a stoat), they manage to thrive in spite of their numerous enemies.

But if the Rabbit is defenceless, what shall we say of the Hare ? True, it is considerably larger (a big one may weigh almost a stone), but from birth till death it spends its entire life on the bare earth, exposed to every possible danger from bird, beast, and wild weather.

Anyone looking at a Rabbit and a Hare in a museum case would see at once that they were very closely related ; he might also suppose that their habits were equally similar. Nothing could be further from the truth. Unlike the Rabbit, the Hare is a solitary animal. It is a nomad, wandering from place to place with no fixed abode.

For most town-dwellers the Hare is best known as a limp figure suspended with its head in a bucket outside some poulterer's shop window ; but how different to encounter one on the open heath ! See him start up almost at our feet and go lolloping up the slopes. A hundred yards he goes, swerving and zig-zagging on his drunken career, then stops. You can see him sitting bolt upright, pricking up his ears as he waits for our next move to start him racing again. Very kangaroo-like he looks, his fore-legs held in the air and his hind-legs far more elongated than are the Rabbit's. (For that reason he invariably runs *up-hill*, even when he is surprised by people coming over the crest of the heath. If he tried to run with the gradient

he would soon be head-over-heels.) Notice, too, the extraordinary prominence of those ears, longer and more upright than the Rabbit's, tipped with white and black, and what a brisk, alert air they give him. Satisfied that there is no immediate danger, the Hare canters off at his ease. A quarter of a mile farther on we put him up again, and see how he bounds this time—away to a flying start and streaking through the long grass as though no power on earth could stop him.

If, now, we return awhile to the spot where we first saw him and (always supposing that we can find it again) examine his resting-place or 'form', we see that it is a slight hollow where the long herbage has been smoothed and trodden flat under the pressure of the Hare's body, half hidden by the tall stalks of a flowering plant. If it has been used with any regularity (and the Hare is in the habit of returning again and again to a favourite site) the form may be nothing more than a bare oval of damp clay with all traces of grass long since removed by constant scratching and trampling. Had we not threatened to tread him underfoot, the Hare would have been quite content to lie doggo, relying on his natural camouflage for concealment. Closer inspection reveals that the approach to and exit from this form are well-marked trackways, grassy tunnels leading across the meadows. Before the hay is cut it is often possible to follow the course of these tracks through the long grass; for the Hare has regular runs, and if he is not disturbed sticks fairly closely to them. This habit often results in his undoing, for the farmer, seeing him going the same way day by day, sets his traps accordingly and wins himself the reward of a free Sunday's dinner.

Not much to look at, this form, laid open to rain, wind, frost, and lightning; yet it is the only home the Hare ever knows. In such a cradle, neither better nor worse than this one, the baby leverets are born. These families are smaller

in numbers that are the Rabbit's, four being a fair average. In most years Hares do not produce more than two litters ; but here again it is impossible to lay down any precise rule, for leverets may be born in almost any month, especially if the winter be mild. In view of the close relationship between the Rabbit and the Hare the difference in the appearance and behaviour of the young of the two species can only be called astounding. Whereas the young Rabbit is born naked, blind, and weak, the leveret enters the world open-eyed, clad in warm fur, and in a few days can run quite strongly. This is another example of the workings of evolution, showing how the equipment and natural aptitudes of an animal are gradually determined by the habits of its progenitors. A similar phenomenon is to be observed among the birds : the young thrushes that hatch out in the comparative safety of their nest in the shrubbery are at first helpless, but the young lapwings and partridges born in the open field are highly alert and can run from the start.

Speed is the Hare's sole safeguard. Since he cannot rely on seeking the sanctuary of a warren when danger threatens, he must be more than a sprinter. Not only is he quicker than the Rabbit over a short distance ; he has the necessary stamina to maintain that speed over long stretches. Only the whippet and greyhound are fast enough to run him down. Other dogs he easily outraces ; and when he is hard pressed he may elude even the lithe whippet, doubling in his tracks, clearing high walls, and leaping sidelong in his desperate attempts to get away. His bulging eyes are so placed that he can see behind him as he runs—a wise provision this, for it enables him to anticipate every move of his pursuer.

So far we have omitted to mention that most striking feature of the Hare's life, his spring courtship. ' Mad as a March Hare ', the saying goes—and not without good

reason either, for about that time of year he indulges in what, to human eyes, appear the craziest of antics—careering in circles, standing up to pirouette on his hind legs like a dancing bear, and—maddest of all—running full tilt into dangers that he would be quick to avoid at any other season. Sometimes he runs head-on towards some worker in the fields and pays for his forgetfulness by being knocked on the head with a shovel—though in the ordinary way Jack Hare is a wary animal, shunning the approach of man. The reason? Possibly that his eyes, as we have just seen, are looking behind him: he can ‘see out of the back of his neck’, so to speak, and consequently, his thoughts being elsewhere, he does not look where he is going. But this alone does not explain his quixotic behaviour. To put it plainly, the March Hare is mad simply because he is in love. For a brief space he gives up his solitary life and goes gallivanting over field and furrow in search of company; and when he finds it the excitement fairly goes to his head. Four or five bucks will follow a doe like jealous suitors—and what a dance she leads them! Before she is won there are many quarrels, sham-fights, and arguments. At most times the Hare is a silent animal, but in the ardour of courtship he will grunt, sneeze, and hiss like a cat. The males run at one another like jousters at a tournament, only at the last moment to swerve aside, leap into the air or double back as if afraid of their own shadows; or they will stand and spar like prize-fighters, pummelling one another with their fore-paws, bucking like bronchos. To us such a sight is amusing; and, truth to tell, most of it is nothing more than shadow-boxing, though there are times when the contestants join battle in bitter earnest. Nothing is barred—and there are no pulled punches. Size for size, the Hare has a kick far stronger than a mule.

When he has succeeded in winning a mate, the jack still has to prove his worthiness by driving off others who wish

to pair with her. Quarrels of this sort continue until the early summer, though never quite reaching the same pitch of intensity as they do in March and April.

Although Hares are creatures of the open fields and commons where their movements are readily observable, comparatively little is known about their private lives. When the time comes for her first litter to be born, the doe prepares a special form, often on the sunny side of some sheltering wood or screened by a tall hedge. This nursery is not occupied for long, however. As soon as the leverets are fit to be moved, she carries them in her mouth, gripping them by the scruff and depositing them one by one in carefully chosen places known only to herself. There she leaves them, returning at regular intervals to give them milk. By this means the chances of the whole litter being destroyed are reduced. Knowing by instinct that safety lies in squatting motionless, each leveret remains rooted to the ground until it is old enough to follow its mother to the pastures. It is often said that the male plays no part in the rearing of his family ; but here, as in the case of the fox, there is considerable room for doubt.

That the male Hare is not entirely uninterested in the fate of his own children seems to be shown by the following observation. I was crossing a meadow into which some cattle had just been turned to graze, when my attention was arrested by the sight of a cow tossing its head nervously at some object in the grass. Wondering what the cause of its alarm might be (my first thought was that it must be a snake) I decided to investigate. Luckily the cow still stood its ground, so that I had time to creep up unobserved. Then I saw what it was. There, rearing on its haunches and threatening the cow with whirling paws, was a Jack Hare—a real Jack the Giant-Killer. For a few moments this strange war of nerves continued in silence, like a dumb-show in a pantomime ; but in spite of the enormous contrast

in size, the Hare eventually had his way. The cow thought better of it, turned and went shambling off, lowing in suspicion ; and a few yards farther on the reason which had prompted this deed of heroism was disclosed. Out bounded a second Hare, and, nestling among the buttercups, wide-eyed and tremulous, there lay a couple of day-old leverets. Tip-toe I bent forward to examine them, but, beautiful as they were, I refrained from touching them. Somehow it did not seem right. Instead I edged away and continued my walk as though nothing had happened. Even so, when I returned two hours later there was no sign of them : the doe had taken no chances. Since that day I have had a very high opinion of the intelligence of the ' mad ' Hare, and the utmost respect for his virtues both as a husband and father.

Until well into harvest time the young Hares-of-the-year may be seen in family groups, following their parent doe about the stubbles and fallow fields ; but after September these parties split up and each individual sets out on his own, gallivanting through the wide world of autumn. Jack and doe may never meet again. Indeed, it is doubtful whether the same pair ever come together again in the course of their wanderings.

Like the Rabbit, the Hare is purely vegetarian in his diet. He can live quite comfortably on grass of any kind, and so is never short of food supplies unless there be an exceptionally heavy and prolonged cover of snow. Even then he manages well enough, for his great height enables him to reach the green shoots of bushes or gnaw at the bark of trees. He is a hardy creature, capable of withstanding the severest weather conditions. If he does any damage at all it is not in the pastures but on the ploughland. Turnips he esteems a delicacy, and he will make a sad mess of the sweet cow-cabbage. Worse still, he is known to be fond of the green wheat, chewing the stalk with its leaves and leaving

the unripe ear untouched ; but how trivial is the damage caused by one Hare weighed against that which is perpetrated by a horde of Rabbits !

So far we have limited our remarks to ' the Hare '. More accurately, this should have read ' the Common or Brown Hare '—meaning the animal which is so typical and picturesque a feature of the English countryside. There are, however, two other species, the Blue Hare and the Irish Hare, about which something must be said. In the main they resemble the Brown Hare in most of their habits, but both differ from it in being considerably smaller and in being confined to wilder districts. The Irish Hare, as its name implies, is not found outside Ireland. Some zoologists consider that it is only a variety of the Blue Hare, so we need not consider it at any great length here. But the case of the Blue Hare is interesting if only because it shows what happens when a lowland species seeks to adapt itself to a mountainous life. Its coat has lost that pepper-and-salt sandiness of the Brown Hare, and has gradually been toned down to a drab grey, the colour of the rocks. It is much whiter underneath, and in winter turns almost completely white. (Look out for these white ' Blue ' Hares outside the game-dealer's shop about Christmas time.) We have previously remarked the Brown Hare's awkwardness on a steep slope and how he is often compelled to run up-hill even against his will. In the Blue Hare the hind-legs are nothing like so long : his whole appearance is more compact, more rabbit-like—for obvious reasons.

Like his cousin of the plains, the Blue Hare feeds chiefly in the twilight hours, subsisting on the wiry heather and bilberry shoots, coarse grass, lichens and mosses, which are almost the only forms of plant life that will grow on the wind-swept summits. The daytime he spends crouching among the stones or under a ledge of granite ; and well he may, for he has many enemies. High over the summits,

the eagle sails in the blue or sweeps down through the mists on irresistible wings, pitching without warning on its target ; the wild cat prowls the slopes ; the hill fox slinks from its earth among the boulders . . . a dangerous life indeed ! Though a few Blue Hares are to be found in North Wales and on the Pennine moorlands, their real haunts are in the stony Highlands. In places where the delicate Rabbit would quickly perish of hunger and exposure, they breed and prosper, far above the normal level of cultivation. Unlike the red deer, the cat, and the marten, which have been driven by force of circumstances to inhabit this same desolate terrain, they seem to glory in the barren wilderness for its own sake. The Brown Hare is a hardy fellow, but his hardships are nothing to this. Of all British land animals the Blue Hare is the most spartan—one for whom ‘ the struggle for existence ’ is more than a mere phrase.

CHAPTER XVI

SINGLE-TOOTHED RODENTS (I. SQUIRRELS AND DORMICE)

A SCURRY of leaves in the wood—a clatter of claws on the bark—and there, squatting in the lowest fork of the tree, is a Squirrel. He sits bolt upright, his tail curled up over his back like an ostrich plume, looking the very imp of mischief. The shape of his head is that of a typical rodent, but the tufts on his ears, his eyes protruding like black beads, and his sharp face give him a peculiarly bold, not to say pert, appearance. See how he quizzes us, then scolds us impudently for not going away. Clearly he is more angry than afraid—or is it merely that he is inquisitive? An independent little chap with a good opinion of himself evidently; and rightly so, for compared with the ne'er-do-well rat or the humdrum rabbit, the Red Squirrel is an aristocrat among rodents. He is the very spirit of happy-go-lucky zest and merriment; erratic, yet gay, in all his movements. He waltzes along a bough, races to meet his mate, chatters at her, switches aside and runs pell-mell down the next bole, his claws fairly rattling on the rough bark. A toadstool attracts his eye: in a bound he is beside it, tearing off chunks, stripping the scarlet skin, and tossing over his shoulder the pieces that he does not fancy. He is a most dainty eater, holding each morsel in his fore-paws and nibbling fastidiously. But he has no time to finish the meal: away he flies again. A minute later he is fifty feet high, weaving and running among the tracery of the branches. A creature of sudden whims.

Of all our British wild animals there is none more confid-

ing than the Squirrel. Far from regarding human beings as a menace to be shunned, he seems to regard man almost as an equal. That is why he makes such an excellent pet. Recently I holidayed in the Lake District, at a farm high up among the fells, some distance from the nearest trees. On the morning after my arrival I was awakened by a tapping at the window, and when I drew the curtain, there, sitting on the ledge outside, was as pert a Squirrel as you ever saw, looking at me face to face as much as to say, 'Good morning, lazybones!' Realizing at once that he was in the habit of receiving gifts from the usual occupant of the room, I opened the window. At that he made a dash for the roof; but a moment afterwards presented himself and took from my hand a piece of dry bread. This he broke into pieces, gnawing it greedily and scattering the crumbs on the sill; then, suddenly deciding it was not much to his taste (I learned afterwards that he expected at least an apple), he left me in search of more attractive fare. At breakfast-time I saw him sitting cheek-by-jowl with the farmyard fowls, sharing their hen-corn.

There are good reasons for such confident behaviour. Living as he does in the tree-tops, the Squirrel is well aware of his own security; he can judge to a nicety just how far he dare go without running into danger. He seems to take it on trust that most men are harmless, or at worst blundering nuisances: certainly he goes about his business without much troubling his head about them—unless, of course, they seek to pester him or come *too* near. With the pine marten and the greater hawks eliminated in most districts, he has few natural enemies. There is none to rival or dispute his mastery of the tree-tops.

It is believed that most Squirrels pair for life. However, the two sexes do not live together throughout the year. Each builds its own 'drey', either a globular structure not unlike a magpie's nest, complete with roof and porch, or

else a shallow basket of sticks and withered leaves untidily piled together in a high crotch. Often a hole in the trunk is used, or they make do with an old bird's nest. The drey is used as a bedroom and storehouse combined, or as a refuge to which they fly when danger threatens. In spring the pair set to work to build a special drey in which to rear their young (twins usually, though triplets are common enough); and this is a much larger, more elaborate affair altogether.

Winter dreys are often very conspicuous, but when it comes to building a nursery, the parents are always most careful to choose a site well concealed in the darkness of a thick evergreen, or in some snug, inaccessible hollow of a lofty tree. The nest is lined with dry straw, its floor, walls, and ceiling padded with moss to keep out the cold. In most years a second litter is born in August or September. The families do not remain together for long; but the young ones do not separate until the following year, by which time they are ready to mate and set up house on their own account.

The Squirrel's fondness for nuts is proverbial, but nuts form only a part of his diet. Acorns, hazel-nuts, and beech-mast are all very fine, but supplies do not last a twelvemonth. In summer he is given to raiding birds' nests, looting eggs and young alike. (He is something of a rascal despite his good looks, as the hint of roguery in his eyes might lead one to suspect.) He is partial to bulbs and berries of all kinds. In fir plantations he fairly stuffs himself with conifer seeds, tearing the ripe cones apart scale by scale, shredding them to the wooden core. He gnaws the bark, and rips off the tender shoots of the unborn leaves. He has a weakness for fruit, and during the season is tempted to explore far afield in search of it, raiding orchards and gardens where at other times of the year he is unknown.

Does the Squirrel store food? Certainly he does, but

whether or not with any sense of purpose or foresight it is impossible to say. Several times I have watched him burying acorns in the dry leaf-mould beneath the trees. More often still, I have come across 'dumps' of beech-mast stuffed inside a crevice; but in every case the food had gone rotten—so mouldy that even the hungriest Squirrel would not have given it a second thought. The Squirrel is so whimsical and forgetful that it is doubtful whether these hidden provisions are ever used, unless by accident. Moreover, Squirrels which are seen abroad in winter-time always seem to be searching for *fresh* food—fir-cones or fallen seeds—which suggests that the idea of unearthing these autumn stores rarely enters their heads. Surely the explanation for this forgetfulness is not difficult; nor need we pretend, as some writers do, that the Squirrel is unintelligent because of it. These hoards are made in autumn, the season when food of all sorts is superabundant. There is far, far more than all the Squirrels in the world could possibly eat; and so, for want of anything better to do, he makes his pile, as boys collect marbles or cigarette-cards, not because they need them but because it is a good game. In much the same way some people are loath to destroy the Christmas cards which, year by year, they receive: treasuring them like so much lumber long after their senders are forgotten. It is this same instinct of collectiveness and ownership that prompts the Squirrel to hide away so many nuts. To be sure, should he chance to unearth them again in his winter digging so much the better: he chews them with relish. But why should he bother his head to make a special search? His is a world of plenty, even in winter.

Do Squirrels hibernate? Yes and no. That is to say, they retire for weeks at a time to sleep in their dreys, but there is no month of the year in which we may not safely count on seeing them. Even though the snow lies deep in the woods and icicle spikes droop from the boughs like

pendants of crystal, the Squirrel still ventures forth in search of a bite. His winter sleep is not so long maintained nor yet so profound as that of the typical hibernators. Hunger disturbs it too often.

From time to time letters appear in the newspapers, or statements are made in books, bemoaning the fact that the Red Squirrel is nowadays much rarer than it used to be. As often as not these laments are accompanied by complaints that the decrease is due to the rapid increase of that familiar foreigner, the Grey Squirrel. The first batch of Grey Squirrels was imported from North America in the 'seventies. These soon settled down in this country, where they found things so much to their liking that they multiplied far beyond the expectations of those who originally introduced them. They are by nature more prolific than the Red Squirrel, producing four or five young ones at a birth. They are bigger, too, and more powerful: an average specimen weighs almost twice as much as the indigenous species. It seems true enough that there is a deadly feud between the two species, and that the Red Squirrel stands little chance when faced with this pushing new immigrant. For that reason many people have taken a violent dislike to the Grey Squirrel, and orders have been issued that it should be shot at sight in many districts. It is said that it damages our woodlands; that it eats carrion; that it is nothing more or less than a glorified rat. All things considered, this attitude is as mistaken as it is unjustified, for, after all, though this newcomer may not be endowed with quite the same charm and sprightliness as is our native Red Squirrel, it is nevertheless a most interesting addition to our English fauna. The evidence of its guilt is not so overwhelming that it should be blacklisted. In spite of all that is said to the contrary, cases of the two species living peaceably together in the same wood are not unknown, and there are still many parts of the country

where the Red Squirrel is common enough and the other has failed to establish itself. We may *think* that the increase in the numbers of Grey Squirrels has something to do with the decline in numbers of the Red, but it cannot be proved. Would it not be more just to give the former the benefit of the doubt? In any case, the sooner we resign ourselves to the fact that the newcomer has come to stay, the better.

The Grey Squirrel is such a common sight in many of our city parks that it is, perhaps, hardly necessary to describe it. It lacks the ear tufts and the shrewd puckishness of its smaller relative, but its coat of silvery grey (touched here and there with tawny) is quite handsome. Its tail is less bushy, inclined to scragginess; it is not quite so agile nor so speedy a climber as the other, but it is far more venturesome on open ground. In its general habits there is not much to distinguish it from the Red Squirrel. It builds a drey that to all intents and purposes is the same as the latter's. It prefers deciduous trees wherever possible, and remains active throughout the winter months. It may retire for two or three days at a stretch, but not much longer—a factor which in itself must prevent it becoming over-numerous in this country. During exceptionally hard winters, such as those of 1939-41, the death-roll among Grey Squirrels is severe. Great colonists as they have proved themselves to be, they have not yet learned to adapt themselves to all vagaries of the English climate.

And while we are on the subject of Squirrels and their winter sleep we may, with perfect relevance, consider the case of the Dormouse—perhaps the most classical instance of a hibernating mammal. Certainly we should not allow its name to deter us from including it in this present chapter, for though it may not actually belong to the same family, its appearance is very much that of a miniature Squirrel. Mouse-like as it is in some ways, it bears a close resemblance

to the Red Squirrel in others—in the size and shape of its head, with the same large, beady eyes—in its reddish coat and bushy tail—even in its habit of holding nuts in its fore-paws when eating. Actually the Dormice are in a class of their own : the zoologist places them between the Squirrels and the typical Mice.

I use the plural, 'Dormice', advisedly. In recent years attempts have been made to introduce a European species into the southern counties, known to some people as the Edible Dormouse and to others as the Chinchilla ; but it is with the smaller English Dormouse that we are concerned here. The very name (from the French 'dormer') suggests something of its drowsy character. More than three-quarters of its lifetime is spent in sleep.

Those who wish to see a Dormouse in his natural surroundings must find a well-sheltered hazel copse and choose a warm evening, preferably in July or August. Unless the weather is exceptionally hot, the Dormouse spends the greater part of the day curled up inside his nest, a ball of dried grass tucked away beneath some bush or slung aloft in the thickest part of the branches. If it is a cold day he may be found at home in bed, so deep in slumber that he may be handled without his awaking ; but it is wiser to leave him undisturbed : for this reason, that he enters his nest backwards, pulling the 'door' to after him and wrapping the grasses about him so tightly that it is impossible to see him without pulling the whole nest to pieces. His head is tucked in between his paws and his tail wrapped round over the top so that he looks like a tiny ball of fur.

Dormice are not always so inactive. June, July, and August are their heyday. Then they are out and about, searching for seeds, flower-buds and leaves, insects and caterpillars, in the green woodland. In climbing they are almost as skilled as the spry Squirrel himself, and their appetites are enormous. After pairing they produce one

litter (two in favourable summers) laid in a special nest which is usually not more than four feet from the ground. But apart from rearing a family, their main object in life seems to be eating and sleeping. By the time September comes round the Dormouse is so plump that he seems literally ready to burst. His coat is sleek as never before, his whole body swollen and wreathed with layers of fat. At the first hint of autumn in the air he begins to build another nest, digging in this time under a blanket of dead leaves or in a safe nook in the roots of a tree. October sees him venturing out less and less ; and when the frosts come he falls into a complete coma, from which he does not emerge until the following April. His breathing ceases almost completely ; his circulation falls to such a low ebb that he becomes quite cold. He looks quite lifeless—and to all intents and purposes so he is. Anyone finding a Dormouse in this condition might well be excused thinking that it was a dead thing, this inert scrap held in the hollow of the hand, its fur powdered with frost. Woodmen and other country-folk chancing to exhume such shrivelled remains as these, have been known to take pity on them and try to revive them in front of the fire. Sure enough, after a few minutes in the warmth, the ‘corpse’ stirred and was soon running about as briskly as ever. Kindness of this sort is mistaken nevertheless, for any Dormouse awakened by such artificial means as these almost inevitably dies soon afterwards. Better to leave him in the frozen hedgerow than to interfere with the course of Nature.

That is one of the strange things about hibernation. The colder the weather the sounder the Dormouse sleeps ; but a warm spell in February, or even January, may lure him out with false hopes of spring. When that happens, the mortality among Dormice is liable to be heavy, for they are so delicately framed and so weak and thin after their long fast that they cannot withstand the fall in temperature

which follows. A hard winter, which spells disaster for other animals, is a boon to the Dormouse. A mild winter, on the other hand, often proves fatal. Even hibernation, it seems, is a safety-device which is very far from being foolproof.

CHAPTER XVII

SINGLE-TOOTHED RODENTS (II. RATS)

Rats !

They fought the dogs and killed the cats

And bit the babies in their cradles

And ate the cheeses out of the vats

And licked the soup from the cooks' own ladles. . . .

YOU know the rest. You have seen the posters asking everyone to do his utmost to destroy these loathsome pests whether in town or village. You have heard of the National Rat Weeks that are held throughout the country. Maybe you know of someone who is employed as a professional rat-catcher—or must we refer to him nowadays by his more imposing title of 'rodent operative' ? Why all this trouble and expense over a creature not much bigger than a man's hand ?

The reason is not far to seek. The Brown Rat is one of the most destructive and at the same time one of the most appallingly prolific animals in the world. It breeds five or six times—often more—in the year and each litter may contain anything from five to fourteen young ones ; added to which, it must be remembered that these offspring are themselves ready to breed when they are five or six months old. In one instance a Rat reared in captivity was found to have taken a mate of its own at the tender age of eight weeks. It has been calculated that if all their young ones were to survive, a single pair of Rats would be capable of producing no less than 253,762 descendants in the space of twelve months, and that in two years the number might

become 10,934,690 !¹ Eleven millions from one father and mother ! Admittedly this estimate is largely hypothetical, for it is known that a large percentage of young and old succumb from various causes ; still, it gives some idea of the Rat's potentialities and the immensity of the problem. When it is realized, too, that in a twelvemonth a single Rat will eat the equivalent of eighty large loaves, the menace becomes even more grave. But even that is not the worst of it, for, apart from what it eats, the Rat inflicts an enormous amount of damage in the course of its thieving career. Like all rodents, it lives by gnawing, and in order to get at food it will bore through floor boards, through wooden containers, chew paper and canvas to shreds, almost as if it gloried in sheer destruction. Anything tampered with in this way cannot safely be used afterwards. No one can say just what the extent of the damage caused by Rats may be, but at a conservative assessment it certainly runs into tens of millions of pounds annually—and it has been said that they cost the country as much as £160,000,000 per year. In view of the fact that, despite every effort to stamp them out, there are probably far more Rats than human beings in Great Britain, we may take it that this is not an over-estimate.

Worst of all, the Rat is a carrier of disease.

How has this state of affairs come about ? The original home of the Brown Rat was in Asia. At the end of the seventeenth and throughout the eighteenth centuries it multiplied to such an extent that it overflowed into European Russia. Wherever it went it remained close to the dwellings of men, raiding their food-stores at night-time and using its low cunning to avoid destruction. From Russia it spread into Poland, Germany, and France. Somewhere about the year 1720 it found its way to this country, probably as a stowaway on board the trading vessels sailing to and from the Baltic ports. In a few years it had run like wildfire to

¹ *Rats and How to Destroy Them.* Mark Hovell.

every corner of the land ; and British sailors, quite unwittingly, helped to spread it still farther by carrying it in the holds of their ships to the Americas, to Africa, and to Australia. Nowadays there is no country in any continent where the Rat is unknown. The story of its world-wide advance is one of the most amazing in the realm of Natural History. Wherever man has gone the Rat has gone too, sneaking unseen, unwanted, behind him ; most hated of parasites, crafty in its persistence.

This expansion is the more remarkable when we recall that it was accomplished in the face of stern competition with its blood-brother, the Black Rat. The latter, still sometimes called the Old English Rat, had already become widespread throughout most parts of Europe during the Middle Ages. This was the species that ravaged Hamelin, and helped as much as anything else to bring the Black Death (bubonic plague) to this country. By the time the first Brown Rats made their appearance here Black Rats had been firmly established for a good four hundred years—or rather ‘bad’, for they were detested quite as much as the Rats of to-day. Between the two species there exists a deadly enmity, and the new invaders at once fell to waging war on the rival race. So successful were they in this struggle that to-day the Black Rat has become almost a rarity. Only a few are left, lingerers in one or two seaports, where they scrounge a living from the wharf-sides and warehouses. The Brown Rat now reigns supreme.

There are several reasons why this struggle should have ended in the way it has done. Apart from its inferiority in numbers at the start, the Brown Rat had all the advantages. It was bigger, stronger, more intelligent, possessed of far greater initiative, utterly ruthless. If the two are examined side by side (a comparison which nowadays can be made only in a museum), it will be noticed that the Black Rat is the more slender, altogether more mouse-like in appearance.

Compared with the Brown Rat it looks almost elegant : its ears are bigger, and its tail longer and more tapering. The adjectives 'black' and 'brown' are scarcely helpful, for the Black Rat is actually bluish grey in colour, while the fur of the Brown Rat is so variable that no two individuals are alike. However, unless you live in a dockside area, the chances are that you will not meet with the former, so that the difficulty of distinguishing between the two is not likely to arise. For general purposes, we may take it that there is only one species—the Brown Rat.

It has been said that Rats have not a single redeeming feature, but this does not prevent them from being highly interesting in their ways. If we are to prevent their becoming a national scourge we must study them closely, if only to outwit them and bring about their destruction. It must be confessed that there is something repulsive in the very sight of a Rat. You know that most ladies regard the mouse with a certain horror, and that many people think bats ugly or misshapen, yet both these animals may be said to be curiously beautiful in their different ways. Not so the Rat. Its blunt snout, its shifty eyes and naked ears, give it a decidedly repellent, insolent expression ; and its filth-grey under-parts and scaly-ringed tail add still further to its unsavoury appearance. Usually it avoids the presence of human beings and is content to scuttle away when surprised. Corner it, however, and you will see what a desperate character the Rat is : it bares its formidable incisors and crouches, glaring madly, ready to fly at its assailant.

Rats are so versatile that it is impossible to give any precise description of their habits or their haunts—except that they are never found very far away from human dwellings. Their ingenuity is such that they worm their way into the strongest buildings. They can climb walls that seem quite unscalable. Nothing deters them. Some

inhabit the sewers of our towns and live on refuse. Others infest the foundations of shops and business centres, bore their way through walls and partitions and wreak havoc among the stores when no one is about. Others have taken to the rivers and lead a watery life, for all Rats are strong swimmers. Though they are out and about all through the daylight hours, they are particularly active at night, with the result that often the damage is done before their presence is suspected. Theirs is a real 'underground movement' ; they work unseen.

As a war-time measure, and to eke out his egg-ration, a friend of mine decided to build a new poultry-run at the back of his house. Quite an elaborate affair it was, securely wired both above and below ground. The floor was of concrete, and as the yard was surrounded by a high wall there seemed little fear of Rats being attracted to such a place ; besides, Rats were said to be 'almost unknown' in that district—it was too 'respectable'. Nevertheless his hens failed to thrive, though they were kept supplied with liberal quantities of food, all of which was promptly consumed. Then one night, less than a month after he had purchased his birds, my friend was awakened by a hideous outcry. Next morning he found the remains of one hen that had been literally torn to pieces ; and the wretched cockerel, his pride, was moping in another corner, with a ragged hole in its throat where the Rats had bitten it. Not content with taking the fowls' food, the miscreants had joined forces to murder them. How the Rats had managed to force an entry was a mystery. Traps were set and poison laid outside, but though several were killed in this way the marauders were in no way discouraged. Further precautions were taken : the roosting-boxes were wired over to ensure that the fowls were safe from attack after nightfall ; whereupon the Rats grew barefaced. In broad daylight they worried a second hen, leaving it in such a condition that it had to be destroyed

immediately. In the end my friend had to abandon his scheme altogether. There was nothing for it but to get rid of what poultry remained and pull down the enclosure. Every scrap of food was removed and the whole place disinfected. After that the Rats disappeared, leaving behind them no traces to show whence they had come or where they had gone.

Rats are sociable animals and born co-operators. Stories of Rats deserting a sinking ship or a burning building are not mere fables: they have an uncanny sense that seems to warn them beforehand when things are likely to go wrong. Their only language consists of a series of shrill squeaks, but it is obvious that they are able to understand each other by this means. That they have recognized leaders and work together is a well-known fact. A high-pitched squeal is the signal for them to launch a mass attack; and when hunting in packs they are highly dangerous. The story of Bishop Hatto's death, legendary as it is, is always worth remembering as suggesting, in a vivid, imaginative form, the horrors that an army of Rats *might* perpetrate.

How is it that Rats remain healthy though living in the most unwholesome surroundings? One might think that those that went scavenging in wet drains and reared their families in the stench and darkness of cesspools would sooner or later suffer for it. Apparently they are immune, however, and certainly they can win a livelihood where any other animal would quickly die of starvation. In the wild most creatures that meet with an injury do not survive for long, but here again the Rat is an exception. It can stand up to any amount of punishment. I have seen a terrier shake the life out of one, chew it unmercifully, and then pitch it aside in disgust—and then when it was all over and left for dead the brute slyly opened its eyes and slunk away. Taken in a trap, the Rat will gnaw off its own leg and hobble off to fight again another day. Maimed and mangy Rats are

by no means uncommon. In their private lives they are tolerably clean. They take great care in looking after their families, and defend them to the last ; but this is almost the only good thing that can be said about them. Everywhere they go they trail their tails in the earth, dragging dirt and slime and smearing garbage behind them. In country districts they carry germs of swine-fever, foot-and-mouth disease, and other cattle plagues. They climb trees to rob birds' nests. At best they are an intolerable nuisance. At their worst they constitute a serious menace to the nation's health.

Most people dislike killing or injuring a wild animal. In a previous chapter the argument was that the persecution of such creatures as the stoat, badger, or harmless bat was unjustified, cruel, wasteful, stupid ; but in this case it is as well to assume that we are dealing with a vile criminal and that there can be only one sensible verdict : Guilty on all charges. It is a public duty, incumbent upon all citizens, to see that the death-sentence is carried out forthwith and without mercy.



ENEMIES OF THE PEOPLE.
BLACK RAT AND (*inset*)
BROWN RAT.



HARVEST MOUSE ON
WHEAT-EAR.
A little less than
natural size.



THE BANK VOLE
SAMPLES A
WINDFALL.

CHAPTER XVIII

SINGLE-TOOTHED RODENTS (III. MICE AND VOLES)

LEAVING the detestable Rat, it is quite a relief to turn to that group of pretty little creatures, the Mice and Voles. It is like breathing fresh air again after being shut up in some foul dungeon.

Shall I ever forget my first House Mouse ? It was my seventh birthday, therefore quite an occasion ; and to celebrate it a party had been arranged complete with the grandest cake imaginable. You never saw such a cake ! Inches deep in almond-icing with jellied fruits and heaps of decorations. Imagine my dismay, not to mention my mother's, when it was found that this masterpiece of the kitchen had been tampered with overnight. The icing was covered with pock-marks, and someone had nibbled a hole as big as my little finger in the side of the cake. What was more, the culprit had left a tell-tale track of raisins and crumbs upon the pantry shelf. A Mouse !

Naturally the cake remained uneaten, but my disappointment on that score was more than made up for soon afterwards when we caught the little rascal alive. Have you ever held a live Mouse in your hand, seen him look up at you with those round appealing eyes of his, and felt the tiny mite's heart throbbing with terror under the pressure of your fingers ? Who could fail to forgive him ? I kept him in a box for six weeks, vainly hoping to tame him, until one day he wriggled out and made his escape. I was left heart-broken ; indeed I would have given all the birthday cakes in the world to have had him back again.

The House Mouse is well named. Like the Rat, it has followed men wherever they went, making its home with them and sharing their food. If it were not for the fact that it is so small the damage it causes would be considerable. As it is, hundreds of thousands of them are killed every year, and yet there is never any sign of their numbers diminishing. They are almost as prolific as Rats, and possibly as numerous, but their size limits the extent of their damage. The Rat is a hateful pest ; the Mouse is a lovable nuisance—at any rate to those of us who are not insensitive to the appeal of its very diminutiveness. But maybe this is mere sentimentalism on our part.

Be this as it may, the House Mouse is a curious blend of impudence and timidity. See him peer out of his hole under the wainscot and run across the floor like a clock-work toy. A delicate, spritely imp. How silently he moves ! At the first creak of a floorboard he is instantly startled—leaps like a kangaroo for his corner—and is gone. Keep perfectly still, however, and he grows more confident ; soon he is running up the back of a chair, poking his pointed nose into every corner. Presumably his quest is for food, but so great is his curiosity that he needs must pry into every nook and cranny. He can hold on to a polished surface, wrapping his tail round a hook or a nail to secure himself ; he can hang upside down, squeeze through the narrowest crack, and find his way back to the floor from the dizzy height of the mantelpiece, all with the utmost ease. Back he runs to his hole. There is a subdued twittering inside, as though some earnest conversation were in progress. Soon afterwards he leads forth his family—one, two, three, four, five eager youngsters. Mrs. Mouse, plumper than the rest—for, as usual, another litter is already on the way—comes last. Evidently the first one had been sent to scout round and see if the coast were clear.

Though it would not be true to say that the House Mouse

is confined to buildings—it is often to be seen out of doors, especially in farmyards and straw-stacks—we may safely take it that any Mouse seen in the open fields or woods belongs to another species altogether—the Field Mouse. An unobtrusive little creature, and yet it is probably the most populous of all British animals, exceeding even the Rat in its amazing numbers. If this statement seems incredible it must be remembered that the Field Mouse is to be found everywhere throughout these islands, whereas the House Mouse and Rat are limited to the neighbourhood of towns and houses. Woods and fields, thousands of square miles of open moorland, valley, and mountains—these are the homelands of the Field Mouse. It may be found in Hyde Park or on the rockiest islet of the Hebrides.

Taking the two together, there is no confusing the Field Mouse with its more familiar relative of the pantry. Its tail is much longer. It has very large round ears and prominent eyes—typical of all nocturnal animals. Its waistcoat is pure white, whereas that of the House Mouse is smoky grey. If anything, it is more active and elusive, and this makes it difficult to observe. It comes out chiefly after dusk and spends the daytime asleep in its burrow. In the course of your country rambles you must have seen hundreds of these Field Mouse holes, little circles, the size of a halfpenny, drilled straight into the earth. Some of them lead to a nest about three feet underground. Usually there are three or four of these entrances, so that if danger threatens the occupant has a choice of escape routes—a very necessary precaution this, since the slim weasel is capable of penetrating the Mouse's den. After dark its chief enemy is the stealthy owl, which wafts over on noiseless, downy wings to snatch it out of the grass. Often the silence of the night is pierced with a faint squealing, a stifled cry of pain . . . the death-shriek of a Field Mouse, clutched in those needle talons.

Field Mice live mainly on seeds and berries. They are

most expert climbers and, though they do not use their tails as might have been expected, they will clamber aloft in a hedgerow as nimbly as squirrels. They are very fond of rose-hips and haws, not for the fruit itself but for the seeds which they extract from inside. When they are busy like this, Field Mice have a habit of carrying their food to an old blackbird's or thrush's nest, there to nibble at leisure. In autumn it is always worth while taking a look into these deserted nests, just in case. Very often you will find the remains of one of these feasts there and, if you are lucky, there is just a chance that you may find the Field Mouse still occupied with his meal. He is very sensitive to sounds, but he is very, very short-sighted. This weakness often leads to his being caught alive. Anyone who is lucky enough to catch one in this way should make sure of holding him firmly by the *body*. If you try to seize him by the tail he will certainly give you the slip, for in his haste to get away the Field Mouse has the quaint habit of shedding the loose outer skin. The tail does not actually snap off as does the lizard's, but the trick is equally effective.

Five or six litters are born in the year, each one of which contains not less than half a dozen young ones. At first they are blind and hairless, and cling to their mother's side. A final litter is produced in the late autumn, and these, the latest born, remain with their parents in the nesting burrow throughout the winter months. By that time the others that were born earlier in the year have gone off into the world and made homes of their own. Field Mice do not hibernate, though it is often supposed that they do. Instead, they lay in copious supplies of food in underground stores, so that when the cold weather comes there is little need for them to stir abroad. In this connection, Burns' poem, 'To a Mouse', with its description of the 'wee, sleekit, cowrin', tim'rous beastie' which his ploughshare unearthed on an Ayrshire hillside, is worth recalling. The mouse,

you remember, *ran away*, which shows that it was very wide-awake. A dormouse or a bat would have behaved very differently.

This leaves us with one more species,¹ the diminutive Harvest Mouse. After the Pigmy Shrew, it is the smallest of British mammals. It is so light that a pair may clamber up a cornstalk without causing it to sway or bend. In its general habits it is a typical Mouse, though much the rarest and most difficult to observe. It is found only in countryside where wheat, oats, and barley are the staple crops. In its dexterity and speed as a climber it is quite unequalled, and it uses its tail with all the skill of a monkey. Its nest is one of the most exquisite pieces of animal architecture imaginable. It is a perfect globe, slung between four or five stalks about a foot from the ground. The materials used in its construction are mostly wheat-leaves, skilfully interwoven. Often the little builders twist the *growing* leaf over the roof and sides. When finished, the nest is wonderfully neat and compact—a real fairy palace. At harvest-time these ball-shaped structures, no bigger than tennis-balls, are cut down by the reaper. As often as not the farmer is the only person who ever sees them. Luckily by then the busy little Harvest Mouse has safely reared its three families and is already at work elsewhere, storing up grain and building its winter nest. This latter may be situated in the hedgerow or, better still, in a corn-rick, where there are plenty of stray ears.

With the exception of this rather rare species, all the true Mice and Rats are to be found distributed throughout the length and breadth of the British Isles. There is,

¹ Most writers distinguish yet another, the so-called Yellow-necked Mouse, found in the south and west of England. But the Field Mouse is so variable in different districts that it is perhaps better to regard this rather rare animal as a variety of the common race. Nearly twenty *sub-species* (*i.e.* local varieties) of the Field Mouse have been found in Britain alone.

however, a closely allied family of rodents, the Voles, which are never found in Ireland. A possible reason for this has already been indicated in Chapter II. There are three main species,¹ the Bank Vole, Field Vole, and Water Vole, all of which have certain characteristics in common. In some ways they resemble the Mice and Rats ; in others they are very different.

First the Field Vole. Apart from the similarity in size nobody could pretend that it looked like a Mouse, although anyone catching a glimpse of it as it runs for cover in the grass might easily mistake it for one. Its whole body is far more stumpy. Instead of the Mouse's shrewd pointed nose, the Vole has a blunt, rounded head. Its tail is very short and hairy. The eyes are smaller and the ears so short that they are almost hidden in the long, woolly fur. On the whole, it looks not unlike a miniature brown guinea pig. There are other differences between Mice and Voles that are not so readily observable. The arrangement and shape of the teeth, for instance. The tusk-like incisors are present in both cases, as in all rodents, but examine the molars of a Vole and you will find them curiously angular, set in zig-zags, whereas those of a Mouse are rounder and more regularly spaced. This fact in itself warns us that the two animals are very different in their habits.

No one can say for certain whether the Field Vole is as numerous as the Field Mouse. The chances are that it

Here again sub-species are omitted. Perhaps some mention should be made of the Orkney Vole and Skomer Vole. Both these have lived on isolated islands so long that they have grown to be very different from the mainland species. Thus the Orkney Vole is considerably bigger than the common Field Vole from which it probably originated. As these animals are confined to one or two remote islands, however, it is scarcely worth troubling about them here. Nor does this chapter include the dreaded Musk Rat, which is, in fact, rather like a giant water vole (about the size of a large guinea pig, ginger-red, tail 10 inches long). Anyone seeing a Musk Rat should report it at once to the nearest police-station.

must be. From time to time there are reports of Vole 'plagues' in various parts of the country, districts being ravaged by countless thousands of these tiny creatures. Sometimes these vast hordes appear as if from nowhere. It is often argued that these phenomenal increases are due to wholesale exoduses from other districts—mass-evacuations caused by sudden dearth or climatic changes; but the mystery is not to be explained away by any such simple theory. The secret is probably to be found in that same prolificacy which characterizes all the rodents. Supposing, as often happens, that all the Vole's usual enemies—hawks, owls, weasels, etc.—were killed off in a certain district and that the mortality from natural causes were suddenly reduced to negligible proportions by a spell of unusually favourable weather conditions. In a few very short weeks the numbers would go up by leaps and bounds, and the farmer would soon be at his wits' end to prevent them ruining his land. This is apparently what happened in the South of Scotland some years ago; and it was not until hundreds of short-eared owls came to the rescue that the situation was saved. These owls, guided to the scene of plenty by some unerring intuition, hunted in broad daylight as well as by night, and with such effect that in a few weeks scarcely a Vole remained. Afterwards, when the owls remained to breed, they were rewarded by being shot and having their eggs taken—another instance of man's unfeeling selfishness and his slowness in appreciating the logic of natural causes.

Field Voles are far less active than Mice, though they make up for this to some extent by coming out both at night-time and in daylight. They live chiefly on green-stuffs and do a considerable amount of damage by eating newly sown seeds, sweet clover, and spring wheat. Like the shrews, they are fond of insects. Though they do not dig so deeply as the mice, they are great burrowers. A Vole-

run is a network of shallow passages, usually not more than three or four inches beneath the surface. Often these runs are so intricate and extensive that a whole field may be riddled with them. Where crops or young trees have been planted this can be a serious matter, for when it comes to tunnelling, the Vole is not the sort to be side-tracked by such trivial obstacles as roots: he chews his way through thick and thin. Like all rodents, he glories in every opportunity of using his front teeth. By nature he seems docile, rather a stay-at-home, but he can be very short-tempered and invariably attacks his neighbours whenever they trespass on his private territory. In addition to his system of tunnelled galleries, he has a number of regular runs above the ground. Close by one of these the nest is built—a bundle of shredded grass that has been plaited into the side of a sheltering tussock. Three or four litters are laid in this, beginning in April. With the approach of autumn the Vole prepares a winter hide-out, boring straight down to a depth of two or three feet and there excavating a small chamber. Into this he retires, but his appetite is so great that he cannot be said to hibernate: sluggish as he is, he must be on the scrounge. These winter nests are usually found in damp situations, for all Voles are thirsty mortals.

Most of what has been said of the Field Vole applies equally to the Bank Vole, except that the latter is more local in its haunts. Except when held in the hand, the two are practically indistinguishable. The Bank Vole is the more attractive to look at, for its fur is brighter, a rich shade of chestnut. It is more often to be found by roadside hedgerows and on wooded slopes than in the open fields. It is much more agile than its brother Vole and is often to be seen clambering about in the thick undergrowth under bushes with all the verve and vigour of a Field Mouse. The first I ever saw was sunning itself at the foot of an elderberry. Though I was not three yards away it

YELLOW-NECKED MOUSE.



NEST OF FIELD VOLES.



FIELD MOUSE.





PLATE XV

Above. RED DEER STAGS FEEDING AS THE MIST LIFTS.

Below. FALLOW DEER, BUCK AND DOE.

paid me no attention, and after washing and sleeking itself it proceeded to grub about on the bare earth. Voles are like that : provided that it is not too obvious, they can be perfectly indifferent to the human presence.

Last and largest of the family is the Water Vole, often mistaken for the Rat. Unlike the Rat, however, it is perfectly harmless and is never met with in polluted waters. Sooner or later, it may be expected wherever there is a slow-moving stream or canal, but it prefers riversides well fringed with rushes. In suitable places it lives gregariously, founding colonies after the style of the beaver. In such localities the problem of observing it presents few difficulties, for the Water Vole is of an unsuspecting, easy-going disposition, and, with reasonable concealment and precaution, can be watched at close quarters. Though it has become so specialized in its habits, it remains a typical Vole. It moves slowly, in a sedate sort of way, as though there were always plenty of time for what it has to do. Selecting the pulpy stem of a tall flag-flower, it bites it across the base and proceeds to break it into lengths, champing it carefully. It eats gravely, manipulating the stalk in its fore-paws. There is a placid, amiable look about the Water Vole, and a curiously far-away expression in its eyes. How fat and comfortable and glossy it is, with its whiskers sprouting out from the sides of its face. Obviously it is not aware that it is being spied upon. Tiring of its meal, it sits upright and begins its toilet, licking and combing the soft, umber fur—for, like all Voles, it is very careful of its personal appearance. Surprised, it takes a header overboard. There is a resounding plop in the water as it dives ; but, as with the Water Shrew, we can follow its course by the luminous bubbles that are caught in its fur. Farther upstream we hear a second plop—then another : the whole colony has taken the hint and gone to ground. Unless we are prepared for a long wait, we shall not see them again,

for their bolt-holes are drilled into the side of the riverbed well below the level of the water.

The Water Vole's nest may be either at the end of one of those tunnels so often seen in the river banksides, or it may be built in an open situation, concealed among rushes. There are at least three litters in the year, each of which contains four or five young ones.

Oddly enough, these baby Voles are so eager to take to the water that they frequently do so before they are strong enough to swim. Many are drowned in this way. Remembering how unwilling the puppy seal was to enter the sea and how the otter had to coax her whelps into the river, this fatal precocity of the new-born Voles is distinctly puzzling. Here we have another of those many animal mysteries that intrigue and so often baffle us—mysteries that can be solved only by careful watching and more careful thinking. If Water Voles had been leading a river-water existence for many millions of years—longer, say, than either the otter or seal—we might think that we understood this over-eagerness of theirs to take the plunge. Yet we know that, compared with these two species, Voles are not particularly skilful in the water. They cannot remain submerged for more than half a minute, and the brown rat can swim far faster than they can. If Water Voles *had* been living in rivers longer than otters then we might expect their performance to be rather better than it is. Therefore we cannot attribute the urge to any ready-made instinct for swimming. No ; if we are to have a genuine explanation we must look elsewhere. Probably the best clue, and the one which gives the simplest solution, is that which is concerned with the extraordinarily rapid rate of the young Vole's development. To an even greater extent than with other small rodents, its development is phenomenal. We have already noted the case of a rat that matured in eight weeks and that many mice breed when

they are five or six months old. Parental care is not a strong point in the character of any of the Voles : their progeny receive only the bare minimum of attention, and almost as soon as they are able to run about they are left to look after themselves. Small wonder, then, if the infant Water Vole, left hungry and neglected among the rushes, is driven by desperation to look for food. A plain case of sink or swim !

CHAPTER XIX

THE FLEET OF FOOT (DEER)

THERE are no words to express the grandeur and magnificence of a Red Deer stag : beyond all argument the largest, noblest, and most impressive of all our British land animals. Standing four feet high at the shoulders, his shaggy neck and the symmetry of his branching antlers cause him to look at least twice that height. His coat of ruddy gold and chestnut-brown sets off to perfection the graceful lines of his body. His legs are long and slender, the limbs of an athlete. He looks—and is—every inch a champion. To see him leading his herd across the valley floor, picking his way slowly among the scattered boulders, pausing now and then to lift his head inquiringly, is the sight of a lifetime.

In past centuries Red Deer were hunted in all parts of these islands, for in those days Great Britain was covered with dense forests. To-day those forests are gone, and with them most of the Deer. Robin Hood and his merry men were not their only enemies. Farmers complained that they broke into enclosures and raided crops ; the woodman that they spoilt his trees—until at last they were driven to seek refuge on the desolate mountains. To-day wild Red Deer are to be found only on the treeless wastes of the Scottish Highlands, though one or two herds are still protected in Ireland, Cumberland, the New Forest, and on Exmoor. Here and there a few are preserved, half-tame, in parklands and private estates. Everywhere else they have ceased to exist.

As with all species of Deer, there are striking differences between the sexes. Not only is the male much the larger

and stronger of the two, it is he alone who grows that peculiar head-dress, the horny antlers. Those of the Red Deer are most magnificent. By counting the number of points or 'tines' upon them it is possible to form a tolerably accurate idea of the stag's age. The full number of twelve or fourteen points is not gained until their wearer is five or six years old. The way in which they develop is rather curious. The antlers are not permanent possessions as is sometimes thought. Every year, usually in January, the stag leaves the herd and goes into retirement, hiding himself in the depths of the woods. He is, to put it colloquially, 'not feeling up to the mark'. After a few weeks of lying-up like this the antlers drop off and he is left looking shorn and forlorn, scarcely distinguishable from the hinds. All that remains is a pair of bony knobs on the crown of his head. From these stumps a new set of antlers soon begins to sprout, however—an even more splendid array than that which he has discarded. These grow so rapidly that by June they have reached their full dimensions; but at first they are covered with a soft casing—'velvet' as the huntsman calls it—that causes them to be very sensitive. Consequently for a time the stag continues to lead a peaceful life, biding his time until the horns are worn smooth and ready for action. As the off-season draws to its close he is more disposed to seek the company of his fellow-males, which accounts for the herds of stags to be seen in the summer months. As the antlers harden and grow, so do their owner's spirits revive. When August comes round he is in fine fettle, ready to meet all comers, and at last, after months of waiting, off he goes in search of the hinds, eager to join battle with any stag that he may encounter.

It is clear, then, that the possession of antlers is an over-mastering influence in the life-history of the Red Deer. What uses do they serve? The fact that they are a male attribute suggests that one of their main purposes is to act as

decoration, to attract the females. In most animals sexual differences are not very apparent, but we need not go any further than the birds to find instances of similar discrimination. The peacock's tail is an obvious example. (So, too—believe it or not—is a man's beard.) Of course, there is more to them than that. They can be employed as weapons both for self-defence and for attack. They are most useful for rounding up stray hinds that may feel inclined to wander off on their own; and their appearance is such as to strike fear into the heart of all who see them. They are the outward symbol of the stag's proud strength and spirit.

A few years ago I was walking—scrambling rather—in the Lairig Ghru, a pass high in the heart of the Cairngorm country. It was September, a wild morning of mist and rain, one of those days when the clouds hang low and sullen about the crags. As I plodded up the steep defile, splashing through the wet heather, stumbling over rocks and pools, the silent grandeur grew almost oppressive. Suddenly the stillness near at hand was broken by a hollow, booming roar, such a noise as I had never heard in my life. The angry thunder of it went rumbling through the great corries overhead; and there, looming out of the rain-shroud in front, was a gigantic shape. A Red Deer stag! It was, I suppose, thirty yards away at the least, but what with the fog and my own nervous imagination, it was magnified far beyond its actual size. It stood there confronting me with the full splay of its antlers, as though challenging me to advance a step farther. For a moment I was terrified. For the life of me I dared not have moved—those mighty horns seemed outstretched ready to impale me if I did. They seemed to block the entire pass. For a moment we stood facing each other; then, with a toss of its shaggy mane and a mighty bound, the stag turned tail and went cantering sidelong up the screes and into the

mists. Thank heaven he did ! I confess that the incident left me trembling like a leaf.

Suppose now that we return to the point where we left the stag before—when he was setting out to discover the whereabouts of the hinds. Having found them, he compels them by the sheer force of personal attraction to follow him. If there are no rivals about they are quick to respond and recognize his leadership. From now on he is their lord and master, and they obey his will. It is not long before other stags put in an appearance, however. They announce their approach with that same dreadful roaring already described. At this season (September–October) they are insanely jealous, and so full of fight that it is highly dangerous to approach them. Arrived at the scene, each issues his challenge. If the stag wishes to retain his lordship over the hinds he must accept it and fight ; and so he does. A battle-royal ensues, antlers clashing and interlocking until one or other of the contestants becomes exhausted and is beaten into submission. Forced to his knees, he flees, leaving the victor to marshal his hinds, who have all the while been calmly watching, waiting for the outcome of the combat. Apparently they have no say in this struggle which is to shape their destiny ; if the stranger wins they accept him without question and pay no further attention to their erstwhile ruler.

In contrast to their warlike husbands, the hinds lead a very gentle and peaceful life. They graze at evening and in the early hours of morning, and spend the rest of the day quietly chewing the cud in some safe, sheltered spot. In the early summer those that are about to become mothers leave the flock and seek a well-covered spot, either in the deepest heather or the thickest undergrowth of the woods. There the little calf is born, such a tender weakling that for days it can only lie helpless in its place of concealment. Until it gains the use of its legs, the faithful hind remains

more or less constantly on guard, ready to drive off any animal that approaches its hiding-place or shows signs of seeking to meddle with it. After a week or ten days the fawn is ready to follow the hind in her wanderings ; from her it learns obedience, when to lie still and when to run, how to feed itself, how to recognize and respond to the various danger-signals. Later, hind and fawn join up with others of their own kind and remain with the common herd until the following spring. The yearlings can always be distinguished by their spotted coats (a reminder, as we remarked before, that *all* deer were originally spotted).

All this goes to show that the annual routines of stag and hind are quite different and that the sex-factor plays an all-important part in shaping their habits. At most times the hinds are meek and sociable, though they occasionally quarrel among themselves and rear up on their hind-quarters like boxers. The stag, on the other hand, tends to be solitary and tyrannical, always seeking to domineer over the others by his overpowering presence. Only when the excitement of the breeding season is over do the two sexes, old and young, mingle together. Then only is it possible to witness the grandest and most moving spectacle of all, the finest sight in the whole cavalcade of British wild-life—a great concourse of stags and hinds strung out along the grey mountainside. Fully to appreciate it, however, we need the aid of powerful binoculars, for in districts where they are hunted Red Deer are all but unapproachable. The hinds are often quite unsuspecting : they rely upon their leaders to give the warning. But the stags, ever conscious of their responsibilities, and possibly also with the knowledge that *they* are the target for the sportsman's rifle, are always on the alert. They can read the wind as truly as you can read a book. Before the man has appeared, before he has come within hearing distance, they have scented his approach and are steering the whole herd to

safety. That is why Deer always travel *up-wind*. True, their watchfulness is not infallible, and if the scent is travelling away from them there may be surprises—as the incident that day in the Lairig Ghru may serve to demonstrate. When they occur the stags utter a startled bark, the hinds bleat in confusion, and the whole herd gallops off in headlong flight. Then those long, lithe, sinewy legs are put to excellent purpose. The cloven hooves are perfectly adapted for securing firm footing whether on the loose rocks or on the soft ground of the moorland peat-hags. They travel as easily up hill as down dale, in long swinging strides. Slowing down, they come first to an easy trot, then to a deliberate walk; but whether they are racing for their lives or sauntering slowly as they graze, there is always a dainty spring-like quality in their gait. A stag in full flight leaves the watcher breathless with admiration. With head erect and his antlers laid back across his shoulders (to prevent them catching among the branches if he should take to the woods), he travels with the easy confidence of one who knows he has something in reserve. Last year I saw one near the summit of Helvellyn with a pack of over-enthusiastic fox-hounds after him in full cry. Over the skyline of Striding Edge he came—paused to snuff the breeze—and went plunging down the scree to Red Tarn and up the stiff slopes of Catstycam opposite. The dogs were scarcely three minutes behind; while I was still standing there they came panting and baying, their tongues lolling, as they followed hot on his trail. But by that time the stag had mounted another 2000 feet and was gone into the next valley. Five minutes later the first huntsman appeared, his face red as his coat, halloing and sounding his horn to call off the dogs. He was greatly concerned because the pack had given up following the scent of the fox in favour of the stag, which in this area is strictly protected. He need not have worried. True, the hounds were tough and well-

trained, but from the way things were going it seemed improbable that they would ever catch up with their quarry. Nothing on four legs could have outrun *that* stag !

After the majestic Red Deer, the shy, slight Roebuck may seem, by contrast, to be a veritable pigmy ; yet though he stands no more than two feet high at the shoulders, he is not a whit less high-mettled. The three-pronged antlers of the little buck may not be as imposing as the Red Stag's, but they are quite as dangerous, and though he is no bigger than a collie dog, he has been known to assault and even to kill human beings. This of course was during the rutting season. At other times Roe Deer are nervous and retiring, seldom seen because they spend the daylight hours hiding in the thickest coverts, from which they emerge to feed at night. Even in the Highlands they refuse to take to the open, and hide away in the fir-woods and birch coppices of the great glens. In England there are a few left in the New Forest, while others are preserved in private parks. Everywhere else they have been exterminated. Possibly Henry VIII was the last of our monarchs to kill a genuinely wild English Roebuck, though it is known that they were still hunted in the reign of Queen Elizabeth.

Of the three British Deer, the Roe is handsomest. He is so slightly built, so neatly cut, that there is only one word to describe him—'dainty'. His close fur is a warm red-roan—a colour that changes in winter to a tawny grey. His slender, sensitive muzzle carries markings of black and white. As with other species of Deer, there are conspicuous white markings on each side of the short tail. This is another of Nature's devices : it serves as a guide when the deer are following each other through the gloom of the woods or when travelling at night-time. Since the Roe is very largely nocturnal, this device is most useful. Soon after war was declared posters appeared everywhere admonishing people to 'Wear something White in

the Blackout'. Deer have been doing so from time immemorial!

Unlike the polygamous stag, the Roebuck is content with a single mate and remains at her side throughout the greater part of the year. Though by no means unsociable, Roe Deer are never to be seen in great herds; instead they prefer to keep in pairs or in small parties. It is almost impossible to study them in their haunts and even to catch a glimpse of them demands a long vigil, waiting stockstill at sun-down or daybreak by the wood-edge. Then—but only if he is favoured by the breeze—the watcher may have a momentary glimpse of them as they steal out under the starlight—shadow figures that move across the glade, fading into the mists. Their sight and hearing are extraordinarily keen: at the first crackle of a twig they leap into the air as though they had received an electric shock. If need be they can clear a five-foot wall with ease.

The buck sheds his horns about Christmas-time, and the new antlers grow so quickly that they are fully restored by the beginning of March. Courtship does not begin at once, for throughout the midsummer months the hinds are kept busy with nursery matters. The fawns are dropped in June and quickly learn to follow their mothers, browsing in the greenwood. Like the Red Deer calves, they are at first spotted with white, and they retain this dappled dress throughout the first year of their life. In their second year they don the foxy-coloured coat of the typical adult, while the young bucks add a touch of further distinction by sprouting a pair of single-pronged horns.¹ At this age they are able to lead an independent life and to leave off following the faithful does, who have had them tied to their tails night and day for ten months and more. To be rid of them, the mothers at last turn on their fawns and force them to leave. In July the bucks and does begin to consort

¹ Second-year bucks are called 'prickets'.

together again and courtship between the pairs is resumed in earnest. Compared with the aggressive Red Stag, the Roebuck is perfectly gentle in winning his mate : he chases her round and round in a mazy circle until she agrees to accept him.

It is a pity that nowadays few people can watch the rare Roebuck, but most of us can see the more familiar Fallow Deer, even if only in a state of semi-domestication. Londoners need go no farther than Richmond Park to see them or, better still, to Epping Forest, where they are still quite common and perfectly wild. In summer they are easily identified by their white-spotted coats. This may seem to render them rather obvious at close quarters, but anyone who has seen them gliding through the checkered light and shade of the foliage will agree that it is, in fact, a subtle camouflage. In winter, when its purpose is no longer served, this piebald coat gives place to a uniform brown. In some parks there are Fallow bucks and does that are brown like this throughout the year, but these animals are descended from deer that were introduced to this country from Scandinavia in the seventeenth century. Some authorities argue that *all* our Fallow Deer were originally brought here in this way. But their remains have been found in prehistoric deposits in many parts of England, and there seems to be no valid reason for supposing that the present-day Fallows are not descended from this original native stock.

Apart from their speckled colouring, Fallow bucks have another characteristic feature. Their antlers end in broad 'palms', rather like those of the reindeer or moose, which gives them quite a distinctive appearance. In size and weight large specimens may almost equal the Red Deer. They are great jumpers, but somehow lack the glorious swinging gait and the stamina of the free-born stag. Fallow venison is just as tasty as the Red Deer's flesh, and during

the war numbers of these animals have unfortunately been killed in order to eke out the nation's meat-supplies.

When living in a purely wild state Fallow Deer are not very different in their habits from the species already described. That is to say, the two sexes live separate lives for the greater part of the year, the adult bucks keeping themselves to themselves, and the does herding with the yearling fawns. But those that are kept in the somewhat artificial environment of private parks are given to intermingling fairly freely. It is a common sight to see mixed herds of young and old roaming together on the lawns, often with some stately mansion as their background. Seen in such a setting, where they have lost all fear of men, they may seem to lack the savage grandeur of the wilder Red Deer and the sturdy independence of the Roe. Sometimes they are so tame that they will take food from the hand ; but at other times they will stampede, barking in sudden suspicion. In summer the herds spend much of their time resting, usually in a clearing or under the shadow of trees ; but in the colder season they are constantly on the move. Like all Deer they are vegetarians. They feed largely on grass, and to vary their diet will pull down leaves and berries from the lower branches in much the same way as horses or cattle. When they are not resting or feeding, the does and calves can be very playful, chasing each other and gambolling like lambs. But even in the midst of such frolics they can be very suspicious, breaking off at the first sign of danger. Their sense of smell is quite as acute as the Red Deer's, their eyesight acuter. Away they canter, breaking into a full gallop as the stampede grows, each fawn close at its mother's heels.

All things considered, it is an easy, peaceful life that these Fallow herds lead, wandering as they browse in hollows or on rising ground or through the green spinneys, cropping the lush grass as they go and always moving at their own

sweet will. Their round, dark eyes seem full of gentleness ; their slim legs, tough as whipcord yet smooth as silk, are full of sensitive strength. They look so utterly unoffensive, so docile—and yet always alert, always carrying themselves with immense dignity, ready to fly at an instant. Watching them moving in a line across the parkland, who can fail to ponder—perhaps half-regretfully—on those far-off days when the animal-life of Britain was so much richer and more varied than it is to-day ; picturing to himself the herds that once must have roamed in the endless swamps and forests that are now no more. Then the wolf dogged them, the wild cat struck down their young ones, and man pursued them with his arrows. They were the nomads of the wild, always pausing to listen, to stand and gaze and snuff the air for signs of possible danger. Maybe the parkland Deer of to-day have little to fear, living the cloistered life they do. Nevertheless the instinct of vigilance is bred in them. Ever alert, they hold themselves in constant readiness against surprise, confident that their speed and sure-footedness will guarantee their safety. The cloven hoof has its advantages, especially for the animal with long legs. It makes for a flying start. It is a good thing, so we are told, to ‘be on your toes’. The wild Deer do not need to remember that advice—they are constantly on their toes.

INDEX

- Amoeba, 6.
 Amphibians, 10.
Animal Biology (Haldane and Huxley), quoted, 2.
 Badger, 35, 48, 50, 52, 56, 102, 106.
 Badger sett, 107, 109.
 Baleen Whale, 71.
 Bank Vole, 160.
 Bat, 34, 35, 63, 86-92, 93.
 Beowulf, 20.
 Black Rat, 148.
 blood, mammalian, 65.
 Blue Hare, 33, 36, 135.
 Blue Whale, 72.
 British wild animals, classified list of, 29.
 Brown Rat, 146.
 Camouflage, 35.
 Cetacea, 67.
 Common Seal, 117, 119, 122.
 Common Shrew, 83.
 Coney. *See* Rabbit.
 Coral-polyps, 2.
 Crustacea, 10.
 crystals, 1.
 Darwin, Charles, 4.
 Dinosaur, 10, 14.
 Dolphin, 73.
 Dormouse, 63, 142-145.
 Duck-billed Platypus, 14.
 Elk, 21.
 emotions in animals, 42.
 Epping Forest, 172.
 Eutheria, 14.
 Fabre, Henri, 64.
 Fallow Deer, 34, 172.
 Farne Islands, 122.
 Ferret, 98.
 Field Mouse, 155.
 Field Vole, 158.
 flight, evolution of, 15.
 food-value, 37.
 Fomart, 98.
 Fox, 36, 46, 103-106.
 Fox cubs, 106.
 Gibraltar, 16.
 Giraffe, 35.
 Grey Seal, 35, 48-9, 117, 120.
 Grey Squirrel, 141.
 Hare, 33, 36, 51, 124, 129-135.
 Harvest-mouse, 42, 51, 157.
 Hedgehog, 34, 78.
 hibernation, 63, 140, 144.
 Horseshoe Bat, 89.
 House Mouse, 153.
 Ice age, 21.
 Ichthyosaurus, 69.
 incubation, 14.
 indigenous species, 25.
 Insect-eaters, 77.
 instinct, 39.
 Irish Hare, 135.
 Killer Whale, 36, 74.
 Lemming, 61.
 Leveret, 130.
 Long-eared Bat, 87.
 Mammals, 11.
 Mammoth, 18.
 migration, 60.
Moby Dick, 75.
 Mole, 25, 35, 77, 80.
 Mouse, 62, 153.
 Musk Rat, 25, 158 (footnote).
 Natural selection, 22.
 Noctule Bat, 87.
 Old English Rat, 148.
Origin of Species, 4.
 Orkney Vole, 158 (footnote).
 Otter, 51, 58, 59, 102, 109.
 Owls, 159.

- Pigmy Shrew, 84.
 Pilot Whale, 75.
 Pine Marten, 33, 99.
 Pipistrelle Bat, 87.
 Placental animals, orders of, 16.
 plant and animal life, 2.
 Polecat, 98.
 Porpoise, 69, 73.
 'pricket', 171 (footnote).
 Prototheria, 14.
 Protozoa, 8.
 'puppy-fat', 55.

 Rabbit, 25, 96, 124-129.
 Rabbit in Australia, 125.
 Rat, 62, 146-152.
Rats and How to Destroy Them
 (quoted), 147.
 Red Deer, 36, 41, 49, 164-170.
 Red Squirrel, 137-141.
 Reptiles, 10.
 Richmond Park, 172.
 Rodents, 38.
 Rodents, Double-toothed, 124.
 Rodents, Single-toothed, 137, 146,
 153.
 Roe Deer, 34, 36, 170.

 Sea-anemone, 2.
 Sea-squirt, 2.
 Seal, 34-5, 48-9, 114-119.

 Shrew, 77, 83.
 Skomer Vole, 158 (footnote).
 speech, animal, 44.
 Squirrel, 52, 137.
 Stoat, 33, 96.
 streamlining, 15.

 Teeth, 14, 38.
 Tiger, 18, 35.
Time Machine, The, by H. G.
 Wells, 17.
 Toothed Whale, 71, 73.

 Vole, 97, 158.

 Water Bat, 87.
 Water Shrew, 84.
 Water Vole, 36, 161.
 Weasel, 37, 94.
 Webb, Captain, 116.
 Wells, H. G., 17.
 Whales, 67-76, 116.
 Whiskered Bat, 88.
 Wild Cat, 51, 112.
Wings of the Wild, 15.
 Wolf, 24.

 Yellow-necked Mouse, 157 (foot-
 note).
 Zeuglodon, 69.

